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DOES DRYCLEANING WEAR OUT CLOTHES?

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NEWSPAPERS and magazines frequently carry stories with blaring headlines that "Drycleaning and Pressing Are Hard on Clothes!", or "Too Frequent Cleaning Ruins Your Clothes!", or "Too Frequent Cleaning Wears Out Your Clothes!" Why do some newspaper columnists and feature writers make these statements? Why do some clothing manufacturers carry these statements on labels and hang tags? Why do some retailers say this in their ads? Is there any truth in these statements?

The drycleaning industry has known (from research conducted over twenty-five years ago) that these statements have no basis in fact. But in order to answer this question once and for all with scientific tests, the National Institute of Drycleaning conducted a two-year wear study research project which has just been completed. The study, reported in full here, should put to rest any misconception which may have existed in the past. It shows that *Drycleaning Alone Does Not Wear Out Clothes!*

The Answer: WEAR STUDY AND TESTS CONDUCTED BY NID.

Our study on determining what effect drycleaning has on clothes is divided into three parts:

Part I. Five identical men's suits and four identical women's suits were purchased for use in this project. These suits were used in the following manner:

1) One suit of each set was kept as an original for comparison purposes.
2) One suit of each set was drycleaned fifty times in petroleum-type drycleaning solvent. These suits were finished between each drycleaning.
3) One suit of each set was drycleaned fifty times in perchlorethylene. These suits were finished between each drycleaning treatment.
4) The remaining suits (two men's, one woman's) were placed in use for a two-year period.

Part II. At the conclusion of the two-year project, an evaluation of all the suits in the study was made by two panels. One panel was made up of persons trained in laboratory and drycleaning evaluations; the other panel was made up of persons representing the consumer of drycleaning services.

Part III. An investigation was made of the literature that has been published on previous research on the effect of drycleaning on fabrics carried out in studies undertaken at colleges, universities, and government agencies. This was done in order to determine if such findings substantiate our findings.

I. LABORATORY AND WEAR TESTS ON MEN'S AND WOMEN'S SUITS

Before the suits were purchased for this study, consultations were held with various persons to obtain their thinking and opinions as to the type of suits that should be included in this study. We learned that a considerable amount of work has been done on determining the quality and grades of men's suits, and the construction features that are important in women's suits. Clarice Scott and Margaret Smith, clothing specialists, Institute of Home Economics, Agricultural Research Services, US Department of Agriculture, have done considerable work on this subject. Because some of their findings have an important relationship to our study and the interpretation of our findings, we quote from their publications.

Miss Scott says (*1*) . . . "In a man's suit, construction is complicated—much that affects wearing quality, appearance, and fit, is hidden. Certain qualities show up only with wear and cleaning. And the labels now used in men's suits give little information.

"How then can the buyers of some 26,000,000 men's suits sold in this country each year for over a billion dollars be sure of getting their money's worth? How can they choose wisely from the wide range of quality and price offered on the market?

"Until manufacturers adopt a system of labeling that gives facts, some things will have to be taken on faith in buying suits. On the other hand, much can be learned to help judge whether a suit has the qualities wanted and is a good value for the price . . . what kind of cloth is best for different kinds of wear . . . how different suits are made and how materials and workmanship affect values . . . what points to check when looking at suits and what questions to ask about qualities that can't be seen . . . how to judge fit, so important to the service and satisfaction a man gets from a suit."

Miss Scott discusses all the points of fabric and garment construction that make for satisfactory performance in wear and cleaning. She compares these factors in three grades of men's suits, low, medium, and high.

Many people believe, for example, that if they buy a hand-tailored suit at a high cost, it is an assurance of good performance. Miss Scott points out that the term "Hand-Tailored" as applied to a suit does not mean that every stitch is hand-sewn. For practical reasons, all seams are machine-stitched. To carry a "Hand-Tailored" label, a coat must be made with at least twenty-one specified hand operations. In fine suits, hand operations number more than twenty-one. Miss Scott points out that some hand work is not as long wearing as machine sewing, and unless done by an expert, may not look well.

We were interested, too, in facts required by the purchaser in selecting and purchasing a suit. When we shopped the market, we found very few suits that met the requirements that have been recommended for informative labeling. Those given in the USDA publication, Bulletin No. 688 (*1*) are as follows:

Outercloth: Brand or name of manfacturer. Kind of cloth and fiber

content. Weight of fabric, freedom from flaws, type of wear for which the material is recommended.

Lining: Kind of material. Number of threads to the inch, weight of the fabric, breaking strength, crocking, resistance to rubbing and abrasion.

Coat front: Kind of inner material —whether high-grade hair canvas or a substitute. If hair canvas, percentage of hair and wool.

Collar interlining: Whether high-grade linen or a cotton substitute.

Tape: Whether linen or cotton; whether or not it has been thoroughly shrunk.

Pocketing: Quality of cotton, number of yarns per inch, weight of fabric, breaking strength, resistance to rubbing or abrasion.

Workmanship: Grade of suit—the grade number used in the industry to denote that certain operations were performed in making the suit.

Findings: Whether sewing thread is silk or cotton; kinds of buttons.

Colorfastness of the outer cloth, lining, and threads.

Shrinkage of all materials in suits.

The quality factors listed above may also be applied to the selection and performance of women's suits (*4, 5*).

DESCRIPTION OF SUIT IN OUR STUDY———For our study, we decided that we should select suits in the average price range and medium grade (*1*), made of a representative fabric. We purchased five men's suits of a well-known brand, at a cost of $74.90 each. The fabric in the suits was identical: a brown, plain weave, hard-finished worsted of 100% wool with a white filament nylon yarn that gives the fabric an interesting texture (Fig 1).

Suit No. 1 was maintained as the original.

Suit No. 2 was drycleaned fifty times in a petroleum-type drycleaning solvent. The suit was finished each time it was drycleaned. (Hard wool classification).

Suit No. 3 was drycleaned fifty times in perchlorethylene. The suit was finished each time the suit was drycleaned. (Hard wool classification).

Suits Nos. 4 and 5 were put into use for a period of two years.

In the women's suits, we again decided to select a suit in the average price range and a representative fabric. We decided on a 100% gray wool flannel. It is a known fact that soft-finished woolens and hard-finished woolens perform differently in wear and in drycleaning. Since we selected a hard-finished woolen in the men's suits, we decided on a soft-finished fabric in the women's suits. The nap on the flannel hides the twill weave. The suits cost $50.95 each. (Fig 4).

Figure 1

This is the man's original new suit. The fabric is a brown 100% worsted with a white nylon filament yarn that gives interesting surface texture.

Figure 2

This suit was drycleaned and finished 50 times.

Figure 3

This suit was worn over 1,500 hours during a two-year wear period. It was drycleaned and finished 14 times. It was pressed 23 times in between drycleanings. The trousers were pressed an additional eight times.

Suit No. 1 was maintained as the original.

Suit No. 2 was drycleaned fifty times in a petroleum-type drycleaning solvent. The suit was finished after each drycleaning. (Soft wool classification).

Suit No. 3 was drycleaned fifty times in perchlorethylene. The suit was finished after each drycleaning. (Soft wool classification).

Suit No. 4 was put into use for a two-year period.

OBSERVATIONS MADE ON THE SUITS THAT WERE DRYCLEANED BUT NOT WORN———The suits were examined visually and measurements for shrinkage were taken after five, 10, 15, 20, 25, 30, 35, 40, 45, and 50 drycleaning and finishing treatments. Measurements and dimensional change are given in Tables I, II, III, and IV.

The fabric and garment construction of the men's suits gave very good performance, as may be noted from the small changes that took place over the fifty cleaning treatments. The amount or degree of change would not cause any customer complaint.

The degree of dimensional change in the women's suits was slightly greater than in the men's suits—and the greatest change occurred in the skirts. This may be due to two factors:

1) A soft-finished flannel is known to be more susceptible to shrinkage than is a closely woven, hard-finished worsted fabric.
2) The shrinkage shows up to the greatest degree in the skirt

Figure 4
This is the woman's original new suit. The fabric is a gray, 100% wool flannel.

Figure 5
This suit was drycleaned and finished 50 times, not worn.

length. You will note that the shrinkage measurements in the coat after fifty drycleanings are negligible.

This apparent shrinkage in the skirt length may be accounted for in the way it is finished on the press. The skirt may be placed over the buck of a press, steamed and shaped so that the dimensional change (shrinkage) that occurs in the lengthwise direction of the fabric produces a corresponding change (stretching) in the crosswise direction. This change usually can be

Figure 6
This suit was worn 600 hours during a two-year wear period. It was drycleaned and finished eight times. The skirt was worn an additional 61 hours and had two additional pressings.

overcome by finishing in the same manner, but shaping in the lengthwise direction.

The seaming of the fabric into a garment, as in a coat, contributes, in some instances, to the stabilizing of a fabric so that shrinkage may not be noticeable. This question has been raised by other investigators when they have attempted to correlate shrinkage measurements made on a flat piece of fabric as against shrinkage determinations made by garment measurements. There may also be the additional factor of error, in that the same tension may not be applied on a tape measure, even by the same person, over a period of time.

VISUAL APPEARANCE OF SUITS THAT WERE DRYCLEANED ONLY——

Men's Suits: Visual examination of the suits during the fifty cleaning treatments showed that:

1) After twenty-five drycleanings, the shoulder padding in one suit worked loose and needed repairing.
2) The white nylon filament fibers of the fabric began to work to the surface of the fabric at the notch of the lapel and on the flaps of the coat pocket. Although this was noted after twenty-five cleanings, it did not become objectionable until the fortieth cleaning. The white nylon fibers began working up to the surface of the fabric along the edges of the front closing of the coat at this point.

Women's Suits:

1) In the women's suits, the buttons were functional and were not removed from the jacket before drycleaning. The finish on the buttons began to chip and peel after five drycleanings. This required removing of the buttons and replacing them with a new set.
2) Slight fuzziness was noted around the hemline after fifteen drycleanings. This was not objectionable.
3) After twenty drycleanings, considerable yarn slippage was noted in the hem tape.
4) After twenty-five drycleanings, the left side of the coat facing became loose and had to be mended. The fuzziness around the hem of the skirt became more noticeable. The color of the fabric appeared slightly darker. Upon comparison with the original suit, it was at this point that we noted some of the nap was being removed from the surface of the fabric. It is doubtful that a person wearing the suit would notice this difference if she did not compare the cleaned fabric with the original fabric.
5) After forty drycleanings, the loss of nap became more apparent.

OBSERVATIONS MADE ON THE SUITS THAT WERE WORN AND DRYCLEANED —— You may wonder why we placed two men's suits in wear and only one woman's suit. This was done so that we could observe a suit coat that had been worn, in which the sleeves were rolled in finishing as against a suit coat that had been worn, in which the sleeves were creased in finishing. The creasing of the sleeve did not have any adverse effect, although the fabric appeared to be more shiny at the elbow.

The men's suits received more wear in the two-year period than did the woman's suit. There are two reasons for this:

1) The men's suits could be classed as year-round, whereas the woman's suit was seasonal, a suit that would be worn in the fall and winter months only;
2) Women rotate their clothes more frequently than do men,

TABLE I

Dimensional change* of man's suit No. 2
(drycleaned—petroleum solvent method)
(Expressed in inches and difference from original measurement)

	Original	Number of drycleanings: 5	10	15	20	25	30	35	40	45	50
Jacket											
1) Back of neck to coat bottom	31⅞	31⅞ 0	31⅞ 0	31⅞ 0	31⅞ 0	31⅞ 0	31⅞ 0	31⅞ 0	31⅞ 0	31⅞ 0	31⅞ 0
2) Underarm seam											
Right	21½	21¾ + ⅛	21¾ + ¼	21¾ + ¼	21¾ + ¼	21¾ + ¼	21¾ + ¼	21¾ + ¼	21⅝ + ⅛	21⅝ + ⅛	21⅝ + ⅛
Left	21½	21¾ + ⅛	21¾ + ¼	22 + ⅛	22 + ⅛	22 + ⅛	22 + ⅛	21¾ + ¼	21¾ + ¼	21¾ + ¼	21¾ + ¼
3) Back (armscye to armscye)	18	18 0	18 0	18 0	18¼ + ¼	18¼ + ¼	12¼ + ¼	18¼ + ¼	18¼ + ¼	18¼ + ¼	18¼ + ¼
Right	18¼	18¼ 0	18⅛ − ⅛	18¼ 0	18¼ 0	18¼ 0	18¼ 0	18¼ 0	18¼ 0	18¼ 0	18¼ 0
Left	18¼	18¼ 0	18 + ¼	18⅜ − ⅛	18⅜ − ⅛	18⅜ − ⅛	18¼ 0	18¼ 0	18¼ 0	18¼ 0	18¼ 0
4) Underarm sleeve seam											
Right	12¼	12¼ 0	12¼ 0	12¼ 0	12¼ 0	12¼ 0	12¼ 0	12¼ 0	12¼ 0	12¼ 0	12¼ 0
Leftj	12⅜	12¼ + ⅛	12¼ + ⅛	12¼ + ⅛	12¼ + ⅛	12¼ + ⅛	12¼ + ⅛	12¼ + ⅛	12¼ + ⅛	12¼ + ⅛	12¼ + ⅛
5) Chest											
Trousers											
1) Waistband	37½	37½ 0	37½ 0	37½ 0	37½ 0	37¼ 0	37¼ 0	37¼ 0	37¼ 0	37¼ 0	37¼ 0
2) Inside seam (crotch to edge of cuff)											
Right leg	32⅞	33¼ + ⅜	33¼ + ⅜	33¼ + ⅜	33¼ + ⅜	33⅜ + ¼	33⅜ + ¼	33⅜ + ¼	33½ + ⅝	33⅜ + ¼	33 + ⅛
Left leg	33¼	33¼ 0	33½ + ¼	33⅝ + ⅛	33⅝ + ⅛	33⅝ + ⅛	33⅜ − ⅛	33⅜ − ⅛	33⅝ + ⅜	33½ + ¼	33½ + ¼
3) Outside seam from waist to cuff											
Right leg	44⅝	44⅞ + ¼	44⅝ 0	44⅜ − ¼	44⅜ − ¼	44⅜ − ¼	44⅜ − ¼	44⅜ − ¼	44⅜ − ¼	44⅛ − ⅜	44⅛ − ½
Left leg	44¼	44½ 0	44½ + ¼	44⅛ − ⅛	44⅛ − ⅛	44¼ 0	44¼ 0	44¼ 0	44¼ 0	44¼ 0	44⅛ − ⅛

*−Shrinkage
+Stretch

TABLE II

Dimensional change* of man's suit No. 3
(drycleaned—synthetic solvent method)
(Expressed in inches and difference from original measurement)

	Original	Number of drycleanings: 5	10	15	20	25	30	35	40	45	50
Jacket											
1) Back of neck to bottom of coat	33	33 0	33 0	33¼ + ¼	33¼ + ¼	33¼ + ¼	33¼ + ¼	33¼ + ¼	33¼ + ¼	33¼ + ¼	33¼ + ¼
2) Underarm seam											
Right	24	23⅞ − ⅛	24 0	24 0	24 0	24 0	24 0	24 0	24 0	24 0	24 0
Left	24	24 0	24 0	24 0	24 0	24 0	24 0	24 0	24 0	24 0	24 0
3) Back (armscye to armscye)	18	18 0	18 0	18 0	18 0	18 0	18 0	18 0	18 0	18 0	18 0
Right	19⅛	19 − ⅛	19⅛ 0	19⅛ 0	19⅛ 0	19 − ⅛	19 − ⅛	19 − ⅛	19 − ⅛	19 − ⅛	19 − ⅛
Left	19	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0
4) Underarm sleeve											
Right	12⅜	12⅜ 0	12⅛ − ¼	12¼ − ⅛	12¼ − ⅛	12¼ − ⅛	12¼ − ⅛	12¼ − ⅛	12¼ − ⅛	12¼ − ⅛	12¼ − ⅛
Left	12⅛	12⅛ 0	12⅜ + ¼	12¼ + ⅛	12¼ + ⅛	12¼ + ⅛	12¼ + ⅛	12¼ + ⅛	12¼ + ⅛	12¼ + ⅛	12¼ + ⅛
5) Chest											
Trousers											
1) Waistband	37⅞	37⅞ 0	37⅞ 0	37⅞ 0	37⅞ 0	37⅞ 0	37⅞ 0	37⅞ 0	37⅞ 0	37⅞ 0	37⅞ 0
2) Inside seam (crotch to edge of cuff)											
Right leg	32¾	32⅞ + ⅛	33 + ¼	33 + ⅛	33 + ⅛	33 + ⅛	33 + ⅛	33 + ⅛	33 + ⅛	33 + ⅛	33 + ⅛
Left leg	32⅞	32⅝ − ¼	33 + ⅛	33 + ⅛	33 + ⅛	33 + ⅛	33 + ⅛	33 + ⅛	33 + ⅛	37 + ⅛	33 + ⅛
3) Outside seam from waist to cuff											
Right leg	44⅛	44⅛	44¼ + ⅛	44¼ + ⅛	44¼ + ⅛	44¼ + ⅛	44¼ + ⅛	44¼ + ⅛	44¼ + ⅛	44¼ + ⅛	44¼ + ⅛
Left leg	44⅛	44⅛	44⅛ 0	41¼ + ⅛	44¼ + ⅛	44¼ + ⅛	44¼ + ⅛	44¼ + ⅛	44¼ + ⅛	44¼ + ⅛	44¼ + ⅛

*−Shrinkage
+Stretch

TABLE III

TABLE III

Dimensional change* of ladies' suit No. 2
(drycleaned—petroleum solvent method)
(Expressed in inches and difference from original measurement)

	Original	Number of drycleanings: 5	10	15	20	25	30	35	40	45	50
Jacket											
1) Back of neck to bottom of coat	23	23 0	23 0	23 0	23 0	23 0	23 0	23 0	23 0	23¾ + ¾	22½ − ½
2) Underarm seam											
Right	13⅝	13⅛ 0	13¾ + ⅛	13½ − ⅛	13½ − ⅛	23 0	13½ − ⅛	13½ − ⅛	13½ − ⅛	13½ − ⅛	13½ − ⅛
Left	13⅜	13⅛ − ⅛	13½ 0	13½ 0	13½ − 0	13½ − ⅛	13⅜ − ⅛	13⅜ − ⅛	13½ 0	13¼ − ¼	13¼ − ¼
3) Back (armscye to armscye)	19	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0
4) Underarm seam sleeve											
Right	17½	17¼ − ¼	17⅜ − ⅛	17⅜ − ⅛	17⅜ − ⅛	19⅜ − ⅛	17⅜ − ⅛	17⅜ − ⅛	17⅜ − ⅛	17⅜ − ⅛	17⅜ − ⅛
Left	17⅜	17⅜ 0	17⅜ 0	17⅜ 0	17¼ − ⅛	17¼ − ⅛	17¼ − ⅛	17¼ − ⅛	17¼ − ⅛	17¼ − ⅛	17¼ − ⅛
5) Bust											
Right	11¼	11¼ 0	11¼ 0	11¼ 0	11¼ 0	11¼ 0	11¼ 0	11¼ 0	11¼ 0	11¼ 0	11¼ 0
Left	11¼	11 0	11¼ 0	11¼ 0	11¼ 0	11¼ 0	11¼ 0	11¼ 0	11¼ 0	11¼ 0	11¼ 0
Skirt											
1) Waistband	23¼	28¼ 0	28¼ 0	28 − ¼	27¼ 0	28¼ 0	28¼ 0	28¼ 0	28¼ 0	28¼ 0	28¼ 0
2) Length—side seam											
Right	29½	29¼ − ¼	29½ 0	29⅜ − ⅛	29⅛ − ⅜	30⅛ + ⅝	29¼ − ¼	29⅛ − ⅜	29⅛ − ⅜	29⅛ − ⅜	28¾ − ¾
Left	29½	29½ 0	29½ 0	29½ 0	29¼ − ¼	30⅜ + ⅞	29¼ − ¼	29⅛ − ⅜	29⅛ − ⅜	28⅛ − ⅜	28⅞ − ⅝
3) Bottom of skirt at hemline											
Front	23	23 0	23 0	23⅛ + ⅛	23¾ + ¾	23 0	23 0	23 0	23⅛ + ⅛	23⅛ + ⅛	23¼ + ¼
Back	21	21 0	21⅛ + ⅛	21¾ + ¾	22 + 1	21¼ + ¼	21¾ + ¾	21⅛ + ⅛	21⅛ + ⅛	21½ + ½	21⅛ + ⅛

*—Shrinkage
+Stretch

TABLE IV

Dimensional change* of ladies' suit No. 3
(drycleaned—synthetic solvent method)
(Expressed in inches and difference from original measurement)

	Original	Number of drycleanings: 5	10	15	20	25	30	35	40	45	50
Jacket											
1) Back of neck to bottom of coat	22¾	22⅝ − ⅛	22⅝ − ⅛	22⅝ − ⅛	22⅝ − ⅛	22⅝ − ⅛	22½ − ¼	22½ − ¼	22½ − ¼	22½ − ¼	22½ − ¼
2) Underarm seam											
Right	12½	13⅜ − ⅛	13⅜ − ⅛	13⅜ − ⅛	13⅜ − ⅛	13⅜ − ⅛	13⅜ − ⅛	13⅜ − ⅛	13⅜ − ⅛	13⅜ − ⅛	13⅜ − ⅛
Left	13½	13½ 0	13⅜ − ⅛	13⅜ − ⅛	13⅜ − ⅛	13⅜ − ⅛	13⅜ − ⅛	13⅜ − ⅛	13⅝ − ⅛	13⅜ − ⅛	13⅜ − ⅛
3) Back (armscye to armscye)	18	18¼ + ¼	18¼ + ¼	18⅛ + ⅛	18⅛ + ⅛	18⅛ + ⅛	18⅛ + ⅛	18⅛ + ⅛	18⅛ + ⅛	18⅛ + ⅛	18⅛ + ⅛
4) Underarm and sleeve											
Right	17¼	17 − ¼	17 − ¼	17 − ¼	17¼ 0	17¼ 0	17¼ 0	17¼ 0	17¼ 0	17¼ 0	17¼ 0
Left	17¼	17¼ 0	17⅛ − ⅛	17¼ 0	17¼ 0	17¼ 0	17¼ 0	17¼ 0	17¼ 0	17¼ 0	17¼ 0
5) Bust											
Right	11¼	11⅛ − ⅛	11⅛ − ⅛	11⅛ − ⅛	11⅛ − ⅛	11⅛ − ⅛	11⅛ − ⅛	11⅛ − ⅛	11⅛ − ⅛	11⅛ − ⅛	11⅛ − ⅛
Left	11¼	11⅛ − ⅛	11⅛ − ⅛	11⅛ − ⅛	11⅛ − ⅛	11⅛ − ⅛	11⅛ − ⅛	11⅛ − ⅛	11⅛ − ⅛	11½ − ⅛	11⅜ − ⅛
Skirt											
1) Waistband	28½	28½ 0	28½	28½ 0							
1) Waistband	28½	28½ 0	28½ 0	28½ 0	28½ 0	28½ 0	28½ 0	28½ 0	28½ 0	28½ 0	28½ 0
2) Length—side seam											
Right	29⅝	29⅝ 0	29⅝ 0	29⅝ 0	29⅝ 0	29½ − ⅛	29½ − ⅛	29½ − ⅛	29 − ⅝	29 − ⅝	29 − ⅝
Left	29½	29½ 0	29⅝ + ⅛	29⅝ + ⅛	29⅝ + ⅛	29¼ − ¼	29¼ − ¼	29¼ − ¼	29 − ½	29 − ½	29 − ½
3) Bottom of skirt at hemline											
Front	24	23⅝ − ⅜	23⅝ − ⅜	23⅞ − ⅛	23⅞ − ⅛	24¾ + ¾	23½ − ½	23½ − ½	23½ − ½	23¼ − ¾	23⅛ − ⅞
Back	22¼	22⅛ − ⅛	22⅛ − ⅛	22⅞ + ⅝	22⅞ + ⅝	23 + ¾	23 + ¾	22½ + ¼	22½ + ¼	22⅝ + ⅜	22⅝ + ⅜

*—Shrinkage
+Stretch

hence over the same period of time they do not wear a particular garment as regularly as a man wears a suit.

In the two-year period, the woman's suit was worn 600 hours, as against the men's suits worn 1,500 hours. The woman's suit was cleaned and pressed eight times. In addition, the skirt was worn sixty-one hours when the jacket was not worn, and pressed two additional times. By comparison, the men's suits were cleaned and pressed fourteen times during the two-year period. But the suit was pressed twenty-three times and the trousers an additional eight times between the regular drycleaning periods. At the end of 1,024 hours of wear, a pocket in one of the men's suits had to be mended because the keys carried in the pocket abraded the cotton lining fabric and caused it to go into holes.

The dimensional changes that took place in the suits that were worn from the fifth drycleaning to the end of the two-year wear period are given in Tables V, VI, and VII. In the opinion of the wearer, the suits gave satisfactory performance in wear and in drycleaning.

II. REACTIONS OF THE JUDGING PANELS TO THE SUITS THAT WERE DRYCLEANED FIFTY TIMES AND THE SUITS THAT WERE IN SERVICE FOR A TWO-YEAR PERIOD

We removed all forms of identification from the men's and women's suits and assigned a number to each one. We prepared a questionnaire and asked ten persons who are trained in laboratory and drycleaning evaluation to look at the suits and answer the questions asked.

Then we asked ten persons who represent typical purchasers of wearing apparel and drycleaning services to observe the suits and answer the same questionnaire. The results are given in Tables VII and VIII.

The results show that the untrained observers were not able to identify either a suit that had been worn for a two-year period and drycleaned, or a suit that had been drycleaned and finished fifty times. (See Figures 1, 2, 3, 4, 5, and 6).

Observers who had been laboratory-trained in fabric evaluation were more accurate in their evaluations because they knew what to look for: abrasion of the fabric in the underarm areas of the coat and the crotch of the trousers; perspiration staining of the jacket lining in the underarm areas are "tell-tale" signs that distinguish between a suit that has been worn and one that has only been drycleaned.

As indicated, eighteen out of the twenty-person panel stated that

TABLE V
Dimensional change* on man's suit No. 4
(Expressed in inches and difference from original measurements)

	Original	After five wear periods and five drycleanings		After two-year wear period	
Jacket					
1) Back of neck to coat bottom	31½	31⅝	0	31⅞	+ ⅜
2) Underarm seam					
Right	23¼	23¼	0	23⅜	+ ⅛
Left	23½	23½	0	23⅜	− ⅛
3) Back (armscye to armscye)	18¼	18¼	0	18	− ¼
4) Underarm sleeve seam					
Right	18½	18⅛	0	18	− ⅜
Left	18⅛	18⅛	0	18⅜	+ ¼
5) Chest					
Right	10¾	10¾	0	10½	− ¼
Left	10¼	10¼	0	10⅝	+ ⅜
Trousers					
1) Waistband	36	36	0	36	0
2) Inside seam (crotch to cuff)					
Right leg	30⅝	30⅝	0	30¼	− ⅜
Left leg	30⅞	30⅞	0	30¾	− ⅛
3) Outside seam from waist to cuff					
Right leg	40½	40½	0	40½	0
Left leg	41⅜	41⅜	0	41⅝	+ ¼

*—Shrinkage
+Stretch

TABLE VI
Dimensional change* in man's suit No. 5
(Expressed in inches and difference from original measurements)

	Original	After five wear periods and five drycleanings		After two-year wear period	
Jacket					
1) Back of neck to coat bottom	32¾	32¾	0	33	+ ¼
2) Underarm seam					
Right	23⅞	23⅞	0	23⅞	0
Left	23⅞	23⅞	0	24	+ ⅛
3) Back (armscye to armscye)	17⅞	18	+ ⅛	18	+ ⅛
4) Underarm sleeve seam					
Right	19¼	19¼	0	19⅛	− ⅛
Left	19¼	19¼	0	19⅜	− ⅛
5) Chest					
Right	12¼	12¼	0	12½	+ ¼
Left	12¼	12¼	0	12½	+ 0
Trousers					
1) Waistband	34¾	34¾	0	34¾	0
2) Inside seam (crotch to cuff)					
Right leg	32¾	32¾	0	32⅝	− ⅛
Left leg	33⅛	33¼	+ ⅛	32¾	− ⅜
3) Outside seam from waist to cuff					
Right leg	44¾	44¾	0	44½	− ¼
Left leg	44	44⅛	+ ⅛	44⅛	+ ⅛

*—Shrinkage
+Stretch

TABLE VII
Dimensional change* in ladies' suit No. 4
(Expressed in inches and difference from original measurements)

	Original	After five wear periods and five drycleanings		After two-year wear period	
Jacket					
1) Back of neck to bottom of coat	23	22⅞	− ⅛	22⅞	− ⅛
2) Underarm seam					
Right	13⅞	13⅞	0	13⅞	0
Left	13¾	13¾	0	13⅝	− ⅛
3) Back (armscye to armscye)	17¼	17¼	0	17¼	0
4) Underarm seam sleeve					
Right	17⅛	17⅛	0	17¼	+ ⅛
Left	17	17	0	17¼	+ ¼
5) Bust					
Right	11½	11½	0	11⅜	− ⅛
Left	11½	11½	0	11¼	− ¼
Skirt					
1) Waistband	27¼	27¼	0	27¼	0
2) Length—side seam					
Right	28¾	28¾	0	28½	− ¼
Left	28⅝	28⅝	0	28¾	− ⅛
3) Bottom of skirt					
Front	21	21	0	21	0
Back	19⅛	19⅛	0	19¼	+ ⅛

*—Shrinkage
+Stretch

TABLE VIII
Questions and responses on the men's suits

	Laboratory personnel		Consumers	
	Correct	Wrong	Correct	Wrong
Which suit do you think is the original?	10	0	8	2
Which suits do you think have been worn and dry-cleaned?	9	1	4	6
Which suits do you think have been drycleaned and pressed 50 times?	9	1	4	6
Do you consider any of the suits wearable?	10 said all wearable		10 said all wearable	
List the numbers of the suits you do not think wearable.	X		X	

TABLE IX
Questions and responses on the women's suits

	Laboratory personnel		Consumers	
	Correct	Wrong	Correct	Wrong
Which suit do you think is the original?	7	3	4	6
Which suit do you think has been worn and drycleaned?	6	4	3	7
Which suits do you think have been drycleaned and pressed 50 times?	7	3	4	6
Do you consider any of the suits wearable?	9 said all wearable.		9 said all wearable.	
List number of suits you do not think wearable.	#1		#4	

(Both #1 and #4 were drycleaned 50 times. These two persons stated they would wear the suits for everyday but not for Sunday best).

they considered all the suits wearable. As may be expected, all persons do not have the same standards of appearance—what may be acceptable to one may not be acceptable to another.

A sixth question was asked of both panels:

"What effects of wear do you notice in the suits that you have indicated were worn and drycleaned?" We have summarized their answers.

Men's Suits:

Cuffs, pocket edges show signs of wear.
Fraying of the fabric at the lapel.
Worn looking.
Abrasion of the fabric.
Pocket repaired.
Discoloration of the underarm lining and inside waistband.
Split in the collar.
Buttonholes look worn.
Buttons are discolored.
Shine on seat of trousers.
Color change in fabric (one said lighter; another said darker).
Soft appearance of fabric reduced. (This statement was made in comparing the worn and cleaned suit with the original).

Women's Suits:

Loss of nap.
Stitching in lining pulled apart.
Hem tape frayed and worn looking.
Wear spots in seat of skirt; elbow of sleeve.
Buttons and buttonholes look worn.
Perspiration stains on lining.
Small moth hole. (The suit was stored over the winter months).

This summary shows some of the shortcomings of fabric performance and garment performance in wear. NID has observed these wear factors for many years in garments that have been sent to NID's Textile Analysis Department, and in other wear studies that have been undertaken from time to time. Some of these problems have been reported in the Technical and Fabrics-Fashions bulletins. The illustrations shown are typical examples. (See Figures 7, 8, 9, and 10).

III. OTHER STUDIES SUBSTANTIATE NID'S FINDINGS

No one has ever determined just how long a person should expect to wear and launder a garment, or wear and dryclean a garment. Most commercial laboratories wash or dryclean a garment five times in order to determine its serviceability to a given method of cleaning. In a recent publication of *American Fabrics*, it has been indicated that twenty-five drycleanings is the average wear and cleaning life of a garment.

Several studies have been undertaken by colleges, universities and government agencies that have shown that drycleaning itself has little effect on fabrics designed for durability and serviceability. It is a known fact that some high-styled fabrics and novelty constructions are designed for eye appeal; hence serviceability and drycleanability are sacrificed. A long wear life should not and cannot be expected from such fabrics.

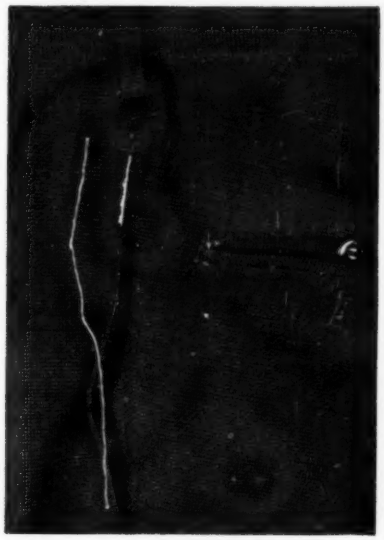

Figure 7
A pair of 100% wool trousers worn by a car salesman. The right pocket edge is worn from putting his hands in and out of the pocket while reaching for keys.

Figure 8
The inside pocket of a pair of trousers worn by a store manager. The cotton lining fabric wore out from the heavy keys he carried in his pocket.

A) Fellowship tests conducted in 1932-33 on "The Effect of Drycleaning Solvents upon Fabrics" by William D Appel, then chief of the Textile Section of the Bureau of Standards, and E E Hughes, research associate, National Association of Drycleaners (5), showed that there was no loss of tensile strength in drycleaning. Several different fabrics were tested in several different solvents used generally in commercial drycleaning, including Stoddard Solvent and a number of commercial

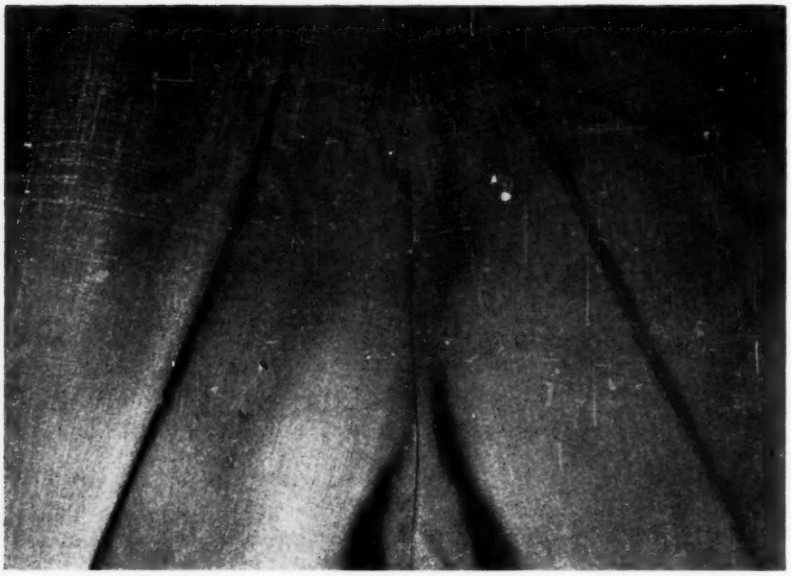

Figure 9
These trousers were worn by a traveling salesman. He wore a hole in the seat of the trousers, as well as removed the pink surface yarns that create a textured surface effect. The seat of the trousers is worn smooth from "just sitting" and sliding in and out of a car.

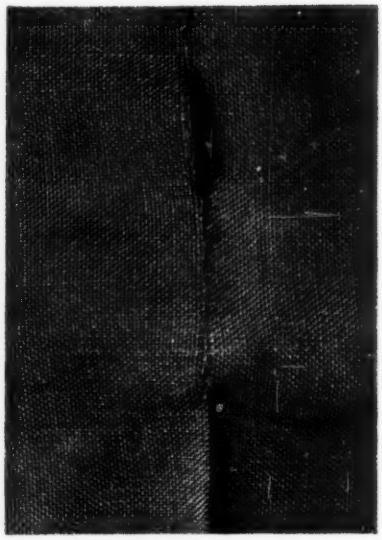

Figure 10
These trousers split along the crease line in the leg of the garment. The 100% worsted, plain weave fabric construction contributes to this type of damage.

synthetic solvents. This report shows, too, that there was no shrinkage of any of the fabrics in the series of tests, which consisted of drycleaning through ten cycles.

B) Lund, Phelps and Norton *(6)* studied five wool flannels made of new and reused wool. One flannel was made of new wool only, three of mixtures of new and reused wool, and one of reused wool only. The physical characteristics of these materials were measured on a set of control swatches as delivered from the factory. Swatches were removed after drycleaning five, ten, and fifteen times. Another set was stored at room temperature for the duration of the study. Skirts were made of these flannels and put into wear service.

This study showed that storage appeared to have resulted in only minor changes in the fabric. Drycleaning resulted in some small increases in thickness, weight, and breaking strength and in elongation. In numerous cases, these seemed to be less marked in those fabrics with larger proportions of reused wool.

This study also showed that the effects of wear alone were increased by increased duration of service, as would be expected. Also in general, they appeared to have been increased by increasing proportions of reused wool in the fabric. Wear combined with drycleaning was said to have resulted in progressive losses in strength and elongation as the proportion of reused wool increased. But this loss of strength was also noted in the control samples that were not drycleaned.

C) Lund, Phelps, Norton and Miller *(7)* studied three weights of new all-wool serge that were made into trousers and worn by men students at South Dakota State College. Three trousers of each material were worn 1,500 hours, three for 3,000 hours, three for 4,500 hours. All were drycleaned after every 300 hours of wear.

Physical measurements were made and reported.

The study showed that drycleaning did not produce marked changes in the fabric, but some minor variations were noted. Wear alone caused these materials to lose weight, thickness, and extensibility, and ". . . is thought to be chiefly responsible for the deterioration of the fabric in these garments. The first wear period showed small changes in many instances, but continued wear resulted in losses which were of considerable magnitude and which became increasingly large as wear progressed."

Visual observations of the trousers indicated that most of the effects of wear became apparent after about 1,500 hours of wear and before 3,000 hours of wear. The character and evidence of wear and the location of worn areas were obvious—holes and fraying at the turn of the cuff, frayed and worn pocket edges, holes in the seat area, threadbare and worn buttonholes.

It is a known fact that many factors contribute to the performance of fabrics to drycleaning. The degree to which a fabric stretches or shrinks depends on:

1) Characteristic of the fabric, weave, twist of yarn, fiber content, and finishing treatment during manufacture; and
2) The method of cleaning, for example, drycleaning, wetcleaning, or laundering.

D) Fletcher and Jones *(8)* in a study on the dimensional change of certain cotton, wool, and rayon woven fabrics during various cleaning and pressing processes, found that cotton and wool fabrics shrank most in laundering and least in drycleaning. The dimensional changes of all the continuous filament acetate fabrics were about the same in all three cleaning methods. In the continuous filament rayon fabrics the dimensional changes in laundering and wetcleaning were about the same, and were greater than those in drycleaning. Laundering caused the most shrinkage in the spun rayon fabrics; wetcleaning produced the most shrinkage in the mixed acetate and rayon fabrics. Drycleaning produced less shrinkage than wetcleaning; and on the whole laundering

(Concluded on page 949)

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December 29, 1958

ADDRESS BEFORE THE SOUTHEASTERN SECTION*

GEO O LINBERG, *President*

MR CHAIRMAN, Members and Guests of the Southeastern Section—

This is my last public address as president of your Association. There is no place I would rather be at this time than here in the South. No Section has given my administration more support and cooperation than I have had from yours and the others in the South. In delivering this final talk, it is fitting and appropriate for me to come before my friends here in the Southeastern Section of AATCC.

If you will permit me, I would like to review some of the things I have tried to do during my term of office. I should also like to point the way to the future of the Association, as I see it. I feel sure that your new president, Weldon Helmus, will carry on in the best tradition of AATCC.

I would ask only one favor from each and every one of you—that you give him your wholehearted backing. As he unfolds his program to you, I know that you will at once find that you have a splendid leader to head the Association. If you will give him the kind of help you have given me, AATCC will continue to move forward and to prosper.

When I took office two years ago, I presented a four-point program, both as an immediate and a long-range target. In brief, this called for a membership of 10,000 strong; an income from corporate supporters of $100,000 to be used for research; a broadening of our technical horizons to include research in developing methods of test for industrial end-use as well as extending our influence in the consumer area; and finally a program to enlist young people in our industry. I would like to take these points one by one and develop them for you.

There is no question in my mind but that there is a 10,000 potential membership for AATCC. It has been demonstrated right here in this Section, that with concerted effort you can, in just one year, bring in enough new members to entitle you to an additional Councilor. With the same kind of drive, you could add still another Councilor in 1960. If every one of the fourteen Sections increased its membership rolls by ten percent, we would be well on our way to our goal of 10,000.

When my good friend, Sydney Cone, addressed the Piedmont Section last April, he put it this way. . . .

> "There are some executives who believe that they have enough patent medicines in their shops to justify cutting off the contact of their technical people from all other technical people. To these executives I would like to suggest that it is impractical to preserve secret processes or secret methods by keeping your technicians out of circulation.
>
> "If the Association did not exist, I believe our technicians would inevitably gravitate together and that they would continue to exchange general information of a proper unclassified nature. I would rather have our young men go out to these meetings three or four times a year than to see them ingrown within our own establishments."

I think Mr Cone represents the general attitude of management, so if you go to management with this proposition and explain the benefits of AATCC membership which will accrue to their companies, I feel sure that management will take steps to see that their people join our Association.

AATCC probably has been responsible, more than any other single force, for enabling the textile industry to maintain orderly technical housekeeping through standard test methods.

Without a sound basis of measurements, founded on industry-wide accepted methods of test, our production would be chaotic and our progress hopelessly snarled. However, our research and technical program continues to lag behind the needs of the industry, but I am hopeful that, with more adequate financing, we can increase our services. There are still many companies which are not supporting the AATCC as Corporate Members. I would like to see our program and our services become so vital to all companies that they could not afford to by-pass membership in AATCC. We now have a budget of $73,000 for the research and technical phases of our operations, I would like to see this increased to $100,000.

Here is another place where we need help from management and where you can bring your influence to bear. Recently, I addressed an open letter to the management of the textile industry. I would like to read it to you.

> "Most of us recognize that the textile industry, more than ever before, needs coordinated technical information to solve its production and merchandising problems.
>
> "The complexities brought about by new scientific developments, coupled with an aggressive demand by competing industries for the consumer dollar leave us little choice. To stay in business, we must keep pace with the national emphasis on technological achievement.
>
> "We have the facilities to do this on an industry-wide level. We have one of the world's finest research groups of some 400 experts who are volunteering their time, talents and experience in assembling a vast array of priceless data in the interest of the wet-processing industry. The machinery for this is provided by AATCC through the laboratories it maintains, the services of its national headquarters

*Presented December 6, 1958 at Atlanta, Ga.

staff, and a highly organized committee structure.

"Every company in the industry is sharing daily in the benefits resulting from AATCC's research and technical program. This program is being geared to the broader needs of the textile industry which we see all around us. It must have whole-hearted support. Not less than $100,000 is requested to do the kind of job that will help give our industry the lift it so urgently needs.

"We want every company in the industry to be identified with the success of this undertaking as a Corporate Member of AATCC. We are counting on an enthusiastic response and the cooperation of all concerned to achieve our goal."

To the men and women in our industry, we have the responsibility for providing a common meeting ground where they may find the best in science and technology to aid them in their careers. The aims and objectives of our Association, as conceived thirty-seven years ago, are just as practical and meaningful today. They represent our rallying point, and lest we take them for granted, I want to recite them verbatim from our Constitution.

First, our object is to promote increase of knowledge of the application of dyes and chemicals in the textile industry; second, to encourage in any practical way, research work on chemical processes and materials of importance to the textile industry; and third, to establish for the members a channel by which the interchange of professional knowledge among them may be increased.

We have come a long, long way from the days when a dedicated group of textile chemists founded AATCC and kept it going in the early years. Today, on our research committees and in our membership, we have representatives of retail stores and mail order houses. There are home economists from industry and from educational institutions. During the recent convention in Chicago, I was struck by the number of women members who attended; not the wives of our own members, but technically trained women who have achieved suffrage in science as well as at the polls. We have people from a variety of industries serving on our research committees—from automobile companies, from drycleaning and laundering companies, from rubber companies, home-appliance manufacturers, soap companies, salt companies, and many others. Much of this broadened participation has resulted from the trend of textile manufacturing companies to orient their thinking to marketing. Consumer end-use in AATCC's research program has reached a point where you now see in the stores hang tags on garments referring to an AATCC method of test.

What does this all mean? It means that we are now an important public institution with great responsibilities which we must carry out in the public interest. The realization of these tremendous responsibilities is now upon us, and we are about to take stock of where we stand. The council has called for a special committee to study AATCC's long-range objectives. We have only to look back ten years to realize that we may see some very substantial changes in the next ten years in our industry that will have an important bearing on the welfare of our Association. We cannot play it by ear.

We must give careful study to the rapid changes taking place in our technology and make sure that we continue to serve the needs of the companies and the individuals who have built this Association into what it is today.

In these times, the young people of our country are thinking about electronics, nucleonics, and supersonics. We know they are not thinking much about careers in textiles. If they knew that our industry can provide careers comparable with other industries in opportunity for advancement and rewards in satisfaction and service, I feel sure that we would not have to worry so much about filling our ranks. We are beginning to do something about that, for we have recognized the need to build a reservoir of talent and promise for those to follow in our footsteps.

This has become a serious problem.

I understand that the employment service we set up at the Chicago convention had many more companies looking for people than individuals looking for jobs. This seems to be particularly true in the dyeing end of our industry. Each one of you can help correct this situtation if you will make it a point to look around among the young people you know in high school and pick out a likely textile chemist. Take him through your plant. Talk to his parents and his high school advisor. Explain the opportunities that are available to him in this industry. There is much effective recruiting that can be done with the help of our Sections throughout the country.

During my term of office, it has fallen to me to help guide our National Headquarters through a reorganization.

Since our executive secretary took over the direction of staff operations in September 1956, much has been accomplished to create a more effective service organization. We have worked together closely to try to give the Association the kind of Headquarters office that can handle the many technical and administrative problems that need to be dealt with by a central office. We have grown in size, in the scope of our activities, and in prestige, and we must have the necessary machinery available to manage our affairs in a business-like manner. The days of "do-it-yourself" are over, and more and more we will be forced to rely on our National Headquarters to support the voluntary activities of our membership with trained specialists in association work. Our research committees need help and assistance, as do a number of our administrative committees on such matters as conventions and corporate membership promotion. What we can do will be dependent on our income, and only as income increases can the National Headquarters services be expanded to meet the Association's needs.

I have noted with much interest an opinion that has been taking shape in the South concerning the relocation of our Headquarters in one of your textile schools. In fact, I had an invitation to stop off on my way down here and look over the facilities of North Carolina State. Since the Council has not recognized the possibility of giving up the present location, I did not feel I had the authority to accept this invitation. Since this general subject was discussed at one of your recent meetings, I thought I would touch upon it as a matter of interest. As you may know, the Council has an agreement with Lowell Technological Institute to maintain our National Headquarters there until 1963. We have a very desirable arrangement with LTI and space, light, heat, and general maintenance are provided without charge. Within the next year the Association will occupy quarters in a new building which is now going up on the campus. Since we are a national, and in fact an international organization, with broad areas of interest, I personally feel that our main concern is to have the National Headquarters situated under the most favorable

(*Concluded on page P942*)

1958 Intersectional Contest ———

THE INFLUENCE OF GINNING CONDITIONS AND SUBSEQUENT FIBER PREPARATIONS ON CERTAIN PROPERTIES OF COTTON FABRICS*

SOUTHEASTERN SECTION

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The effects of selected wet preparation methods on cotton fiber are reported. One variety of cotton fiber was selected after both irrigated and nonirrigated growth. Irrigated- and nonirrigated-grown fibers were ginned under three ginning conditions. The six specimen fibers were then treated by certain wet preparation methods.

The paper reports the various physical and chemical properties of the various cottons studied, and the effects produced by certain wet-processing methods.

INTRODUCTION

EXTENSIVE knowledge of the processing of cotton textiles has been accumulated through research and practical experience. Today research information developed on new dyes, resins, and other finishing agents is very detailed and extensive. Investigations in this field are usually conducted on arbitrarily selected cotton yarn or fabrics. When the developed techniques are applied to cotton in the textile mill, sometimes unanticipated variables are encountered beyond the scope of the research investigations. Some of these variables can be related to the history of growing and harvesting of the cotton fiber as an agricultural product. The history of the cotton fiber can be given in many ways when the cotton is considered as having certain generic relationships (*1*); as grown under certain climatic and soil conditions (*2, 3, 4, 5, 10*); as picked by hand or by machine (*6*); and as ginned with selected equipment (*7*). Each of the above-mentioned factors can cause in cotton primary chemical and physical changes which may be reflected in the finishing of cotton textiles. It is nearly impossible for textile mills to obtain correlative information or to attempt to test all of the variables associated with the cotton consumed in a single mill. On the other hand, it is impossible for all new developments to be systematically studied on cottons representative of all of the varied types that develop in a cotton crop even in one year, much less from year to year. If such a program of testing and evaluating had been attempted, even with the limited knowledge of one hundred years ago, we would still be waiting for the use of indigo-dyed cottons. It is impossible to make predictions about the cotton fiber that may have to be processed year by year or sometimes batch by batch in a textile mill. These conditions are not as hopeless as one may think or wish to believe. The different processing techniques and customer requirements in the textile industry are as numerous and as confusing as the variables nature imparts to the growing cotton plant.

The textile chemist can continually conduct extensive investigations of new and old processes and products. Textile chemists use the same test procedures and research approaches to develop technological information for many specific purposes, either to sell textile chemicals or to sell finished textile materials. When unusual or unanticipated results are obtained in a textile mill in finishing cottons with the so-called time-tested methods, procedures, and products, the situation may sometimes be made confused by the lack of information about the way the cotton in question was grown and harvested. For example, the 1956 and 1957 cotton crops were more heterogeneous than usual, owing to adverse climatic conditions at the time of growing or picking. During these two years, other production changes occured: more extensive use of irrigation (*8*), the use of higher temperatures in ginning, and additional lint cleaning (*7*).

The Southeastern Section Committee believed that, if the properties of selected cottons grown and ginned under known conditions were investigated, a better understanding of some of the problems of the textile chemist would result. We also believed that the information we might develop could answer some of the so-called wild rumors that get started whenever problems develop in the processing of cotton. We regret that time did not permit us to develop more extensive information. This paper, which we wish to be considered as a progress report on the processing of cotton-textile products, will cover the inter-relationships among selected cottons as outlined in Figure 1. These cottons were:

1) The same variety of cotton irrigated and nonirrigated and ginned under three ginning conditions;
2) These cottons scoured with an anionic surfactant, with and without sodium carbonate or tetrasodium pyrophosphate;
3) These cottons scoured with a nonionic surfactant, with and without sodium carbonate or tetrasodium pyrophosphate;
4) These cottons alkaline scoured and bleached with peroxide; and
5) The scoured and bleached cottons dyed with direct dye.

We have developed information on these cottons relating to the percent moisture regain; percent alcohol-extractable substances; pH of water extracts; percent water-soluble reducing substances; cupriethylene diamine fluidity; Causticaire maturity; differential dye maturity; percent dye absorption; percent lint foreign matter; number of raw stock neps; a com-

*Presented by Frederick T Lense on October 31, 1958 at the Conrad Hilton Hotel, Chicago, Ill, during the 37th National Convention.

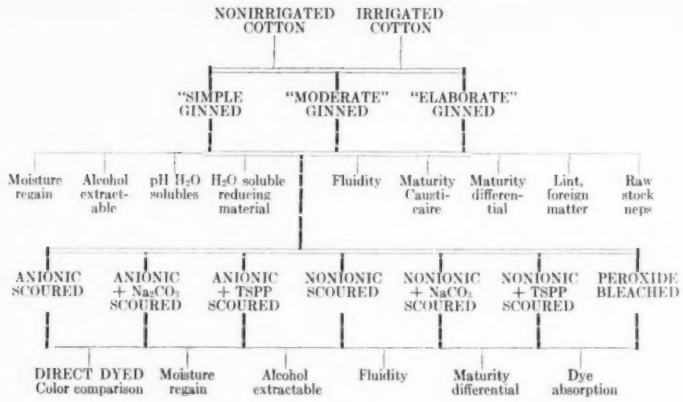

Figure 1
An outline of the research work and a listing of tests performed

parison of cottons after various scouring and bleaching procedures; and a comparison of dyed samples. Therefore, this Contest paper relates to the physical and chemical properties of cottons and the associated effects produced by selected wet-preparation methods.

EXPERIMENTAL PROCEDURES

The ginned cotton used in this work was initially used in a program (*7*) which was planned to evaluate the effect of double lint cleaning of cotton from the standpoints of monetary return to the cotton producer and the effect on the spinning quality of the cotton. These tests were planned and conducted by the United States Department of Agriculture Cotton Ginning Laboratory, Stoneville, Mississippi, in cooperation with the Delta Experiment Station of Mississippi. The cotton was Delta Pine Land-15 variety picked fron nonirrigated and irrigated fields in the same plantation from the 1956 cotton crop. The degree of defoliation of the field at the time of picking was representative of the Mississippi Delta area. The gin-test conditions consisted of three overhead cleaning and drying setups, which might be described as simple, moderate, and elaborate. Changes in these conditions are sometimes referred to variations in temperature of ginning. The gin equipment employed is given in Table I.

The following techniques and procedures were used in this study.

MOISTURE REGAIN —— The moisture regain of the cottons was determined in duplicate according to ASTM D-629-57T.

ALCOHOL EXTRACTABLES—— The alcohol-extractable matter of the cottons was determined in duplicate on weighed samples dried in an oven at 105°±2°C for 24 hrs. The samples were placed in a Soxhlet extractor and extracted for four hrs with 99% isopropyl alcohol. The hot alcohol extract was filtered into a tared weighing flask, the flask placed on a steam bath, and the isopropyl alcohol evaporated. The flask was then dried at 105°C±2°C, cooled in a desiccator, and weighed. The residue in the flask was recorded as alcohol extractables.

pH OF WATER EXTRACTS—— The pH of the water extract from the cotton (*9*) was determined on duplicate two-gram samples of cotton. The cotton was wet thoroughly with six ml of hot distilled water by kneading with a glass rod. Then 4.5 to five ml of the extract was recovered by centrifuging. The cotton was held off the bottom of the centrifuge tube by means of a wire basket. Three milliliters of the water extract was used for the pH measurement with a Beckman pH meter.

WATER-SOLUBLE REDUCING SUBSTANCES (ESRM TEST)—— The water-soluble reducing substances (ESRM) (*9*) were determined on one ml of the extract from the pH test. This extract was treated with a Clinitest tablet, whereby sufficient heat was generated to boil the sample. Fifteen seconds after boiling ceased, the sample was diluted to 15 ml with distilled water. The color developed was compared to the color developed in standard reducing solutions similarly treated, containing dextrose as the reducing substance. Standard reducing solutions were prepared having a concentration ranging from 0.3 mg/ml to 1.5 mg/ml dextrose in increments of 0.3 mg/ml. The ESRM value is the whole number corresponding to the concentration of dextrose; for example, an ESRM value of three matches the standard reducing solution of 0.3 mg/ml dextrose.

FLUIDITY——The fluidity of selected samples was determined in duplicate by the general method of dispersing cellulose in cupriethylene diamine as outlined in ASTM 539-53.

MATURITY INDEX——The maturity index of selected samples was determined in triplicate by the Causticaire method as published for information by the ASTM.

DIFFERENTIAL DYE MATURITY ——The differential dye maturity was determined in duplicate by the method outlined in ASTM D1464-517. This procedure is based on the Goldthwait technique.

DYE ABSORPTION——The apparent percent dye absorption was determined (*10*) in duplicate by the following method:

The dye Direct Green 26 (*CI* 34045) was used. The cotton sample, weighing 500 mg, was wet out for 10 minutes in a 0.05% solution of an anionic surface-active agent, 25% solution. The sample was removed from the solution and the excess water blotted off with a clean towel. The fibers were dyed in a 20 x 200 mm test tube for one hr at 80°C in 25 ml of a dye solution containing 0.02% dye and 0.2% sodium sulfate. The

TABLE I
Type of equipment used in ginning cottons

Elaborate	*Moderate*	*Simple*
Feed control unit	Feed control unit	Feed control unit
Twenty-four (24) shelf tower drier		
Seven cylinder inclined cleaner		
Bur machine (two-split feed)		
Twenty-four (24) shelf tower drier	Twenty-four shelf tower drier	
Six cylinder horizontal cleaner	Six cylinder horizontal cleaner	
Seven cylinder inclined cleaner	Seven cylinder inclined cleaner	
Standard size feeders with heat	Standard size feeders with heat	Standard size feeders with heat

amount of dye absorbed was measured by determining the amount of dye remaining in the solution. A one-ml aliquot was removed from the dye solution in the test tube, and placed in a colorimeter tube and diluted to 10 ml with distilled water. The dye concentration in this tube was determined by use of a Klett photoelectric colorimeter using a 600 mμ filter. The data were calculated and reported as percentage of dye on the fiber. A calibration curve for the dye analysis was prepared.

NEP COUNT——The nep count of the raw-stock cotton was determined in triplicate by the method outlined in ASTM D1446-53T. Neps in this instance are one or more fibers occurring in a tangle or unorganized mass; neps should not be confused with other foreign matter found in cotton where the fiber is still attached to the seed or other trash.

LINT FOREIGN MATTER—— The nonlint content of the cotton was determined in triplicate by the method outlined in ASTM D1451-56T. This is the method in which the Shirley Analyzer is used.

SCOURING METHODS —— Six different scouring methods were used, three with an anionic surfactant, an alkylarylpolyether sulfate, and three with a nonionic surfactant, an alkylarylpolyether alcohol. The solutions were prepared as follows:

0.1% anionic surfactant in solution
0.1% anionic surfactant in solution plus 2.0% Na_2CO_3
0.1% anionic surfactant in solution plus 2.0% TSPP
0.1% nonionic surfactant in solution
0.1% nonionic surfactant in solution plus 2.0% Na_2CO_3
0.1% nonionic surfactant in solution plus 2.0% TSPP.

Duplicate equal portions of the six cotton samples, irrigated and nonirrigated, respectively, ginned by simple, moderate, and elaborate methods, were separately sewed into cotton-gauze bags. These twelve cotton samples were wet out in plain water prior to loading in a Smith-Drum, model PDM-1, one-lb package and stock dye machine. The machine was charged with the desired scouring solution and the solution was circulated in the machine for 10 minutes at 120° F. The temperature was raised to 200° F, and the scouring was continued for 30 minutes, with five-minute inside-out and outside-in shifts. The solution was drained and an inside-out flush given for five minutes, and the machine was drained. The scoured samples were removed from the machine and air dried. This procedure was repeated for each of the six scouring methods.

ALKALINE SCOUR AND PEROXIDE BLEACH——An alkaline scour and a peroxide bleach were conducted in duplicate on equal portions of the six types of cotton samples. The samples were separately placed in cotton-gauze bags and boiled for 30 minutes in a solution containing 1.5% NaOH and 0.5% anionic surfactant, sodium N-methyl-N-oleyl taurate. The cotton was rinsed thoroughly and spun dry. The cotton was then saturated with a solution containing 15 lb of 33% hydrogen peroxide and 15 lb of 42° Bé sodium silicate and made up to 100 gal of total volume. The pickup of peroxide and silicate was 22%. The cotton was steamed in a pad-steamer for 30 minutes at 200° F, washed thoroughly, and dried in an oven.

DIRECT DYE METHOD——A direct dye. Direct Orange 37 (*CI* 40265), which is known to dye immature cotton well, to exhaust rapidly, and to migrate poorly, was selected for use. This dye does not act similarly to the dyes used in the differential dye maturity tests: these dyes exhaust on the fiber to a major degree in proportion to the thickness of the fiber walls. Duplicate equal weights of cotton were separately placed in cotton gauze bags. The cottons were dyed in seven different sets. Each set consisted of irrigated and nonirrigated cottons ginned under simple, moderate, and elaborate conditions for each type of fiber preparation, namely the six different scouring methods and the one bleach method. Each set was placed in a 20:1 80° F dyebath of 1%, on the weight of cotton, Direct Orange 37 and the bath was then heated for a period of 13 minutes to reach the boil. At the boil, a total of 20%, on the weight of cotton, of NaCl was added in three portions. The additions were made at intervals of five minutes. Each addition was twice the weight of the previous one. The bath was maintained at the boil for 30 minutes after the last salt addition. The samples were rinsed in running water at room temperature, removed from the water, and oven dried. The samples were evaluated for depth and color under both incandescent and noontime north skylight lights. Comparisons were made separately and collectively between types of cotton, types of ginning conditions, and types of preparation treatments. The samples were cut into a near powder by means of a laboratory Wiley Mill with a 20-mesh screen and placed in glass vials for inspection.

RESULTS

The measured properties of the nonirrigated and irrigated cottons, ginned under simple, moderate, and elaborate conditions, are given in Table II. The measured properties of the anionic surfactant-scoured cottons, nonirrigated and irrigated cottons, ginned under simple, moderate, and elaborate conditions, are given in Table III. The measured properties of the same cottons scoured with the nonionic surfactant are given in Table IV. The properties of the alkaline-scoured and peroxide-bleached cotton are given in Table V.

Figure 2, showing a photograph of pads prepared from nonirrigated and irrigated cottons ginned under simple, moderate, and elaborate conditions, is presented to show typical differences in the appearance of the cotton even after it has passed through a Wiley Mill.

The cottons ginned under simple conditions obviously contain more

TABLE II
Properties of nonirrigated and irrigated cotton from same plantation Each ginned with three types of gin equipment

Gin equipment	*% moisture regain*	*% Alcohol extractable*	*pH water extract*	*H_2O soluble reducing substances*	*Fluidity Rhes*	*Maturity Caustic*	*Maturity differential*	*% Lint foreign matter*	*Raw stock neps*
A—*Nonirrigated*									
Simple	7.0	0.68	7.0	6	5.6	77	89	4.14	20
Moderate	7.1	0.55	7.0	5	4.2	76	90	2.83	19
Elaborate	7.2	0.71	7.3	5	5.0	77	82	2.47	27
B—*Irrigated*									
Simple	7.0	0.73	7.8	4	4.5	79	87	5.11	13
Moderate	7.1	0.63	7.6	4	5.2	80	92	3.07	16
Elaborate	7.2	0.51	7.4	4+	5.3	80	92	3.33	18

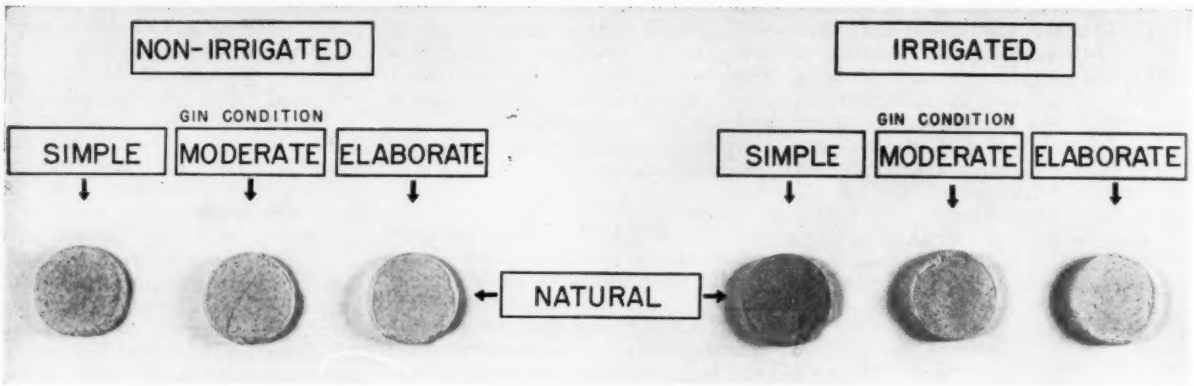

Figure 2
Typical differences in cottons investigated

TABLE III
Properties of nonirrigated and irrigated cotton from same plantation
Each ginned with three types of gin equipment
Determined after anionic scours

Type cotton	Gin equipment	% Moisture regain	% Alcohol extractable	% Dye absorption	Maturity differential
A—Scoured with 0.1% alkylarylpolyether sulfate (anionic surfactant)					
Nonirrigated	Simple	6.9	0.52	89	92
	Moderate	6.8	0.54	92	92
	Elaborate	6.9	0.52	88	92
Irrigated	Simple	7.6	0.56	94	92
	Moderate	7.1	0.58	97	92
	Elaborate	7.1	0.52	94	92
B—Scoured with 0.1% alkylarylpolyether sulfate plus 2.0% Na_2CO_3					
Nonirrigated	Simple	7.9	0.53	74	92
	Moderate	7.7	0.42	78	92
	Elaborate	7.7	0.45	80	92
Irrigated	Simple	8.2	0.56	88	92
	Moderate	8.2	0.53	83	92
	Elaborate	8.1	0.52	85	92
C—Scoured with 0.1% alkylarylpolyether sulfate plus 2.0% TSPP					
Nonirrigated	Simple	7.8	0.52	88	88
	Moderate	7.7	0.57	88	92
	Elaborate	7.7	0.53	84	87
Irrigated	Simple	8.3	0.52	89	92
	Moderate	8.3	0.54	90	92
	Elaborate	8.2	0.51	91	97

TABLE IV
Properties of nonirrigated and irrigated cotton from same plantation
Each ginned with three types of gin equipment
Determined after nonionic scours

Type cotton	Gin equipment	% Moisture regain	% Alcohol extractable	% Dye absorption	Maturity differential	Fluidity, Rhes
A—Scoured with 0.1% alkylarylpolyether alcohol (nonionic surfactant)						
Nonirrigated	Simple	8.1	0.24	81	83	
	Moderate	8.0	0.25	85	89	
	Elaborate	8.0	0.27	85	85	
Irrigated	Simple	7.4	0.36	82	92	
	Moderate	7.1	0.34	83	89	
	Elaborate	7.1	0.30	86	92	
B—Scoured with 0.1% alkylarylpolyether alcohol plus 2.0% Na_2CO_3						
Nonirrigated	Simple	7.6	0.26	75	92	
	Moderate	7.5	0.20	75	92	
	Elaborate	7.4	0.26	75	87	
Irrigated	Simple	7.5	0.22	79	92	
	Moderate	7.5	0.19	79	92	
	Elaborate	7.3	0.20	80	92	
C—Scoured with 0.1% alkylarylpolyether alcohol plus 2.0% TSPP						
Nonirrigated	Simple	7.3	0.22	77	83	6.2
	Moderate	7.3	0.24	82	85	5.6
	Elaborate	7.2	0.27	84	88	5.6
Irrigated	Simple	7.6	0.25	83	89	4.2
	Moderate	7.3	0.26	84	88	4.1
	Elaborate	7.2	0.27	86	72	6.2

trash and specks than cotton ginned under moderate or elaborate conditions.

Similar pads were prepared for all the cottons tested by the differential dye-maturity method. The pads were used in comparing and evaluating differences between cottons.

The direct dyed cottons were compared visually for color value under both incandescent and noontime north skylight lights.

DISCUSSION AND CONCLUSIONS

The data we have obtained show that, as the ginning conditions change from simple to elaborate, the percent moisture regain increases; the raw stock nep count increases; the lint foreign matter decreases; and the pH of the water extract increases for nonirrigated cotton and decreases for irrigated cotton. When we compared the data on the various cottons used in the tests, we found that

1) The pH of the water extract for nonirrigated cottons was lower than for irrigated cottons;
2) The Causticaire maturity was lower for nonirrigated cottons than for irrigated;
3) The lint foreign matter was lower for nonirrigated cottons than for irrigated;
4) The differential dye maturity was lower for nonirrigated cottons than for irrigated;
5) The water-soluble reducing substances were higher for nonirrigated cottons than for irrigated;
6) The raw-stock nep count was higher for nonirrigated cottons than for irrigated.

Only in the differential dye ma-

turity, the lint foreign matter, and the raw stock nep count are there any major differences. It was observed that, for moisture regain and alcohol extractables, there were significant differences between nonirrigated and irrigated cotton and also between different types of scouring, but that no differences developed from a change in ginning practices.

No significant difference was noted in the differential dye maturity of all the cottons, but more erratic results were obtained for the cottons scoured with nonionic surfactants than with anionic surfactants.

The percent dye absorption data appear to indicate a trend for increased dye absorption of cotton with a change from simple to elaborate ginning conditions and a definite higher percent dye absorption for the cottons scoured with anionic surfactants over the cottons scoured with nonionic surfactants. The cottons scoured with Na_2CO_3 and an anionic or a nonionic surfactant give a lower dye absorption when compared to cottons scoured by the other four methods of scouring.

The comparison of the direct-dyed, scoured, and bleached cottons showed that the cottons ginned under simple conditions had more color value than those ginned under moderate and elaborate conditions. No difference in color value was noted in the direct-dyed samples scoured under different conditions for any one type of cotton.

SUMMARY

To develop information applicable to the finishing of cotton textiles, we have used test procedures and techniques which are available and may be applied by most textile chemists. The samples used in this test were more homogeneous as to type than blends of cotton used in any textile mill; therefore, fewer variations may be expected in the results than when cotton is used in a mill. We found indications that ginning methods had an effect on the properties and characteristics of cottons which we tested. We do not wish to imply that different ginning conditions are the primary cause of all unexplained difficulties which may develop in the finishing of all cottons. In this investigation, we have shown, for the first time, the relationship of many factors which are of concern to textile chemists in research, development, and quality control, and we have shown how these factors may or may not be affected by processing conditions. Additional research is necessary to determine how new methods of growing and harvesting cotton may affect the use of old and new textile dyes and finishing methods. Production variables created by the growing and the harvesting of cotton will have more importance with the advent of chemical reactive dyes and resins. When these dyes and resins are ultimately in use, a more homogeneous cotton will be required for optimum results.

TABLE V
Properties of nonirrigated and irrigated cotton from same plantation
Each ginned with three types of gin equipment
Determined after alkaline scour and peroxide bleach

Type cotton	*Gin equipment*	*% Moisture regain*	*% Alcohol extractable*	*% Dye absorption*	*Maturity differential*	*Fluidity Rhes*
Nonirrigated	Simple	7.3	0.39	64	87	5.1
	Moderate	6.7	0.32	67	87	4.8
	Elaborate	6.9	0.39	63	84	4.6
Irrigated	Simple	8.0	0.33	72	88	5.3
	Moderate	7.8	0.35	74	88	5.2
	Elaborate	7.8	0.36	68	87	5.3

ACKNOWLEDGMENT

We wish to express our appreciation to all those who helped make this report possible, and in particular to Robert Montgomery, United States Department of Agriculture, Cotton Ginning Laboratory, Stoneville, Mississippi, for making available the cotton used in this program; and to personnel of Florida State University, Tallahassee, Florida; Georgia Institute of Technology, Atlanta, Georgia; Pepperell Manufacturing Company, Pepperell, Alabama; Eagle & Phenix Division, Reeves Brothers, Inc, Columbus, Georgia; Southern Research Institute, Birmingham, Alabama; Southern Sizing Company, East Point, Georgia; Seydel-Woolley and Company, Atlanta, Georgia; and the West Point Manufacturing Company, Shawmut, Alabama.

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AATCC Calender

COUNCIL, COUNCIL COMMITTEES, RESEARCH COMMITTEES

Jan 28-30 (Hotel Statler, New York, NY)
Jan 28—Research Committees
Jan 29—Council Committees, TCR, ECR
Jan 30 (AM)—Council Meeting
May 30, 1959 (Mount Royal Hotel, Montreal, Canada)

NATIONAL CONVENTIONS

Oct 8-10, 1959 (Sheraton Park and Shoreham Hotels, Washington, DC); Oct 6-8, 1960 (Sheraton Hotel, Philadelphia, Pa); September 28-30, 1961 (Buffalo, NY); 1962 (Southern Region)

HUDSON-MOHAWK SECTION

Jan 16 (Jack's Restaurant, Albany, NY); Mar 27 (Chelsea House, Tribes Hill, NY); May 15 (Ladies night, Albany area); June 26 (Annual outing—Antlers Country Club, Tribes Hill, NY)

NIAGARA FRONTIER SECTION

Feb 20 (Niagara Falls, Ont); April 4 (Hamilton, Ont—joint meeting with CATCC)

NORTHERN NEW ENGLAND SECTION

Jan 16 (Colonial Club, Lynnfield, Mass)

PIEDMONT SECTION

Jan 24 (Poinsett Hotel, Greenville, SC); April 10-11 (Robert E Lee Hotel, Winston-Salem, NC); June 5-7 (Outing—Grove Park Inn, Asheville, NC); Sept 25-26 (Barringer Hotel, Charlotte, NC)

SOUTH CENTRAL SECTION

Jan 10, Mar 21, Sept 19 (Hotel Patten, Chattanooga, Tenn); June 26-27 (Outing — Riverside Hotel, Gatlinburg, Tenn)

A LETTER TO CORPORATE MEMBERS

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS
Box 28, Lowell, Massachusetts

December 22, 1958

To the Corporate Members of AATCC:

Gentlemen,

The year 1958 has been remarkable on two counts; first, the continuous flow of technical data coming out of AATCC, and second, the degree to which our Corporate members have supported the research program, despite the generally unfavorable business climate.

Although we had hoped to move toward a $100,000 industry-financed program, our Corporate members managed to hold the line, resulting in only a nominal drop in total Corporate membership income. This is convincing testimony that AATCC research is considered an essential cost of doing business by the 300 companies which have helped to underwrite the research program.

While a detailed report of the year's accomplishments may be found in the issues of AATCC's Proceedings in the *American Dyestuff Reporter*, a brief review of the highlights will bring the program into sharper focus. Perhaps it will encourage you not only to renew your Corporate membership but also to increase your annual dues.

* WASH AND WEAR

AATCC developed a reproducible method of evaluating fabric appearance with respect to freedom from wrinkles after repeated home laundering. Now, "Wash and Wear" can have uniform meaning throughout industry.

* DAMAGE CAUSED BY RETAINED CHLORINE

AATCC revised its tentative test method to provide for better reproducibility of test results between laboratories. Research will continue to determine all factors causing or influencing chlorine retention damage to resin-treated fabrics.

* DIMENSIONAL CHANGES IN WOVEN TEXTILE FABRICS

AATCC issued a new test method for determining dimensional changes to be expected from laundering procedures commonly used in the commercial laundry and at home.

* COLORFASTNESS TO INDUSTRIAL LAUNDERING

A new tentative test method was designed especially for evaluating the washfastness of work-clothing fabrics which are expected to withstand frequent industrial laundering. This test specifies the use of the Accelerotor, a novel and versatile instrument developed by the research division at AATCC National Headquarters.

* MERCERIZATION

A new test method was brought out to determine the presence of mercerization in dyed and undyed cotton yarns and fabrics.

* DETECTION OF ANTIBACTERIAL PROPERTY OF FABRICS

A new tentative test method was adopted for a large variety of materials.

* COLORFASTNESS TO PLEATING

A revised test method was developed to encompass the many new fibers on the market.

* RESISTANCE TO WETTING

This new alternate test method can be more economically run with readily available equipment.

* COMMITTEE ON ODORS FROM RESINATED TEXTILES

This committee has been authorized and is being organized to develop the first industry-wide test method.

* CONSUMER COMPLAINTS

Groundwork was completed for assembling data from periodic reports from testing centers to pinpoint end-use performance failures. Reports will be analyzed to spot areas where industry needs new test methods. The information will be useful to manufacturing and processing interests, retailers, service organizations, publications, educators, research groups, and many others.

This is by no means a complete roster of achievements for AATCC research in 1958. Continuing programs in many segments of technology are in progress in which important new and revised test methods will emerge. A complete list of 70 AATCC research committees appears in the "Manual of Procedure" recently published to aid them in their organizational and administrative activities. The wide range of subjects covered is vital to technical progress in the industry.

In order that the Association may broaden its scope to meet the ever-increasing needs of industry, I hope we may count on help and support from you for 1959.

Sincerely yours,
Geo O Linberg
President

HOW AATCC RESEARCH WAS FINANCED FOR THE FISCAL YEAR ENDING JULY 31, 1958 and 1957

Income	*1958*	*1957*
From Corporate Membership dues	$56,041.68	$57,642.50
From Sustaining Members	445.00	510.00
Deficit made up from other Association income	9,174.39	6,942.57
	$65,661.07	65,095.07
Expenditures		
Salaries, Social Security, etc	$48,896.83	$47,928.45
Supplies and Services	7,429.34	7,841.43
Travel and Meetings	6,518.35	6,113.94
Promotion & Publicity	978.20	2,265.62
Depreciation	1,306.23	945.63
Other general expenses	532.12	—
	$65,661.07	65,095.07

1958 Intersectional Contest———

THE INFLUENCE OF VARIOUS ADDITIVES ON SOILING AND SOIL REMOVAL CHARACTERISTICS OF KNITTED FABRICS*

MID-WEST SECTION

COMMITTEE

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EDWIN I STEARNS
American Cyanamid Co

An investigation has been conducted to determine the effect of selected additives on the soiling and soil-removal properties for a series of typical fibers. The fibers were tested as knitted fabrics prepared by a single manufacturer. Each representative fabric was treated with an equivalent deposition of the additive under test and subjected to the Accelerated Soiling Test as described in Textile Finishing Bulletin No. 148-A, published by American Cyanamid Company. This bulletin includes the construction details of a specialized ball mill soiling apparatus. The equipment is designed to offer a standardized procedure for soiling fabrics under controlled conditions. A specially prepared synthetic soil was used and the relative soiling tendencies were determined by reflectance readings as outlined in the test bulletin.

Generalized conclusions probably cannot be drawn from the data developed to date, but the following specific trends have been indicated by this study:

1) Surface-active agents, particularly nonionics, tend to decrease the dry soiling resistance of most fibers.
2) Of the additives tested, colloidal silica finishes, developed for use as soil retardants, significantly improve the soil resistance of all fibers except Dacron.
3) The soil resistance of Dacron is decreased when additives are applied.
4) Soil removal by washing generally remains unaffected by most additives.

INTRODUCTION

IT IS well known that the rapid development in recent years of man-made fibers has created a challenge for the ingenuity of textile technologists. They have had to employ the variety of new synthetics to successfully compete with or supplement the natural fibers and fabrics subject to consumer acceptance.

The requirements of chemically produced fiber for use in textiles have been very demanding, but most of the major problems have been reconciled. Textile "art" has progressed to the point where almost any type of fabric can be constructed from synthetic yarns or blends of natural and synthetic fibers. The many technical problems of dyeing and other chemical or mechanical processing may be closely controlled to produce the desired end product.

The science of textile finishing has been a major factor in the progress of improving textile fabrics. Softeners, crease-resistant resins, antistatic agents, water repellents, antislip agents, and whiteners are only a few of the many chemical finishes which have helped to overcome any inherent limitations of many fibers and fabrics.

Among the many properties of new synthetic fibers and blends which must be evaluated, resistance to soiling has been considered an important and desirable property for all types of fabrics. Unfortunately, the soiling and soil-removal characteristics of a fabric will vary depending upon its construction, the nature of the fiber used, and any finishes which may have been applied to improve the utility of the fabric. These factors account for the success or failure of the designed fabric in its end use and the resultant soiling characteristics remain somewhat uncontrolled. The development of special finishes which would impart soil resistance and easier soil removal without effecting other qualities of the fabric is a continuing effort. Needless to say, carpet or upholstery fabrics are examples of materials which could readily take advantage of the opportunity to feature effective soiling resistance and soil removal.

Soiling studies are complex and, in addition, are further complicated by the increasing concern for the effect of standard finishes in attracting soil. Thus, the search for soil-retardant finishes and basic research on the causes of soiling have created an awareness that potential new finishes, regardless of intended purpose, should not increase the soiling tendencies of the fabric.

Confident that information in this area would be interesting, valuable, and timely, the Mid-West Section respectfully submits this paper. Recognizing the physical impossibility of attempting a broad comprehensive study of soiling in general, the scope of this investigation was confined to the soiling characteristics of knitted fabrics made from the following fibers: cotton, wool, spun rayon, Dynel, Acrilan, spun acetate, Dacron, Orlon, and spun nylon. These were selected as representative of the fibers in popular use today and tested as knitted fabrics from a single source to eliminate variables in fabric construction and design. Each of these fabrics was treated with the following representative additives:

1) 70 Standard low viscosity carboxymethylcellulose (CMC—3% stock solution).
2) Commercially available product—Colloidal Silica A.
3) Commercially available product—Colloidal Silica B.
4) Typical cationic agent (quaternary ammonium compound—22% active cationic ingredient).
5) Typical anionic agent (alkylarylsulfonate—35% active anionic ingredient).
6) Typical nonionic agent (octyl phenoxy polyoxyethylene ethanol—100% active nonionic ingredient).

The resistance to soiling and soil removal characteristics of each fabric and treatment was then evaluated.

*Presented by James E Miller on October 31, 1958 at the Conrad Hilton Hotel, Chicago, Ill, during the 37th National Convention.

EXPERIMENTAL PROCEDURE

PRELIMINARY WET PICKUP DETERMINATION —— The knitted test fabrics were immersed in water at 80°F for 10 minutes and given one pass through a hand wringer. They were weighed immediately to determine the characteristic wet pickup of each fabric. The percent wet pickup was then utilized in approximating the additive solution concentration to produce an equivalent application of product add-on for each fabric as applied in the same manner (Table I).

TABLE I

Fabric	*Weight-grams* *Wet*	*Dry*	*Wet pickup (%)*
Cotton	104	46	113
Wool	122.5	57	108
Dynel	111.0	49.7	111
Dacron	94.6	47.6	100
Spun acetate	105.1	41.9	125
Spun nylon	115.5	50.4	114
Spun rayon	120.5	48.4	124
Acrilan	133.7	51.1	131
Orlon	147.8	57.9	127

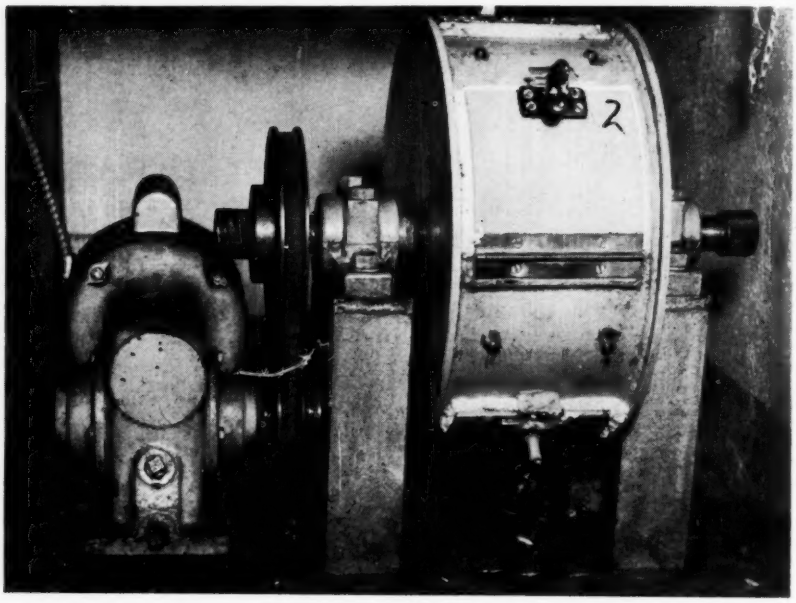

Figure 1
Dry soiling apparatus

ADDITIVE APPLICATIONS—— In order to include the effects, if any, of the amount of additive applied, two concentrations of each material were padded on each sample fabric from bath concentrations calculated to produce approximately the same amount of pickup, by weight, in any case.

A) For impregnation with CMC, fabrics were grouped as follows:

1) 0.5% sol CMC 70–80° F / 4 Dacron, 2 wool
2) 0.45% sol CMC 70–80°F / 3 Dynel, 6 nylon, 1 cotton
3) 0.4% sol CMC 70–80° F / 8 Acrilan, 7 rayon, 9 Orlon, 5 acetate

B) For impregnation with Colloidal Silica A, fabrics were grouped as follows:

1) 1% solids (5% sol) / 4 Dacron, 6 nylon
2) 0.85% solids (4.25% sol) / 2 wool, 3 Dynel
3) 0.75% solids (3.75% sol) / 1 cotton
4) 0.65% solids (32.5% sol) / 5 acetate, 9 Orlon, 8 Acrilan, 7 rayon
5) 2.55% solids (12.75% sol) / 2 wool, 3 Dynel
6) 2.25% solids (11.25% sol) / 1 cotton
7) 1.95% solids (9.75% sol) / 5 acetate, 9 Orlon, 8 Acrilan, 7 rayon
8) 3% solids (15% sol) / 4 Dacron, 6 nylon

C) For impregnation with Colloidal Silica B, fabrics were grouped as follows:

1) 1.0% solids (3.3% sol) / 4 Dacron, 6 nylon
2) 0.85% solids (2.80% sol) / 2 wool, 3 Dynel
3) 0.75% solids (2.48% sol) / 1 cotton
4) 0.65% solids (2.15% sol) / 5 acetate, 9 Orlon, 8 Acrilan, 7 rayon
5) 3% solids (9.9% sol) / 4 Dacron, 6 nylon
6) 2.55% solids (8.4% sol) / 2 wool, 3 Dynel
7) 2.25% solids (7.4% sol) / 1 cotton
8) 1.95% solids (6.4% sol) / 5 acetate, 9 Orlon, 8 Acrilan, 7 rayon

D) For impregnation with a typical cationic agent (22% active ingredient), the fabrics were grouped as follows:

1) 1% act ingred (4.55% sol) / 4 Dacron, 6 nylon
2) 0.85% act ingred (3.87% sol) / 2 wool, 3 Dynel
3) 0.75% act ingred (3.4% sol) / 1 cotton
4) 0.65% act ingred (2.95% sol) / 5 acetate, 9 Orlon, 8 Acrilan, 7 rayon
5) 3% act ingred (12.6% sol) / 4 Dacron, 6 nylon
6) 2.55% act ingred (11.61% sol) / 2 wool, 3 Dynel
7) 2.25% act ingred (10.2% sol) / 1 cotton
8) 1.95% act ingred (8.85% sol) / 5 acetate, 9 Orlon, 8 Acrilan, 7 rayon

E) For impregnation with a typical anionic agent (35% active ingredient), the fabrics were grouped as follows:

1) 1% act ingred (2.86% sol) / 4 Dacron, 6 nylon
2) 0.85% act ingred (2.43% sol) / 2 wool, 3 Dynel
3) 0.75% act ingred (2.15% sol) / 1 cotton
4) 0.65% act ingred (1.86% sol) / 5 acetate, 9 Orlon, 8 Acrilan, 7 rayon
5) 3% act ingred (8.58% sol) / 4 Dacron, 6 nylon
6) 2.55% act ingred (7.3% sol) / 2 wool, 3 Dynel
7) 2.25% act ingred (6.45% sol) / 1 cotton
8) 1.95% act ingred (5.58% sol) / 5 acetate, 9 Orlon, 8 Acrilan, 7 rayon

F) For impregnation with the typical nonionic agent (33% active ingredient), the fabrics were grouped as follows:

1) 1% act ingred (3.03% sol) / 4 Dacron, 6 nylon
2) 0.75% act ingred (2.57% sol) / 2 wool, 3 Dynel
3) 0.75% act ingred (2.25% sol) / 1 cotton

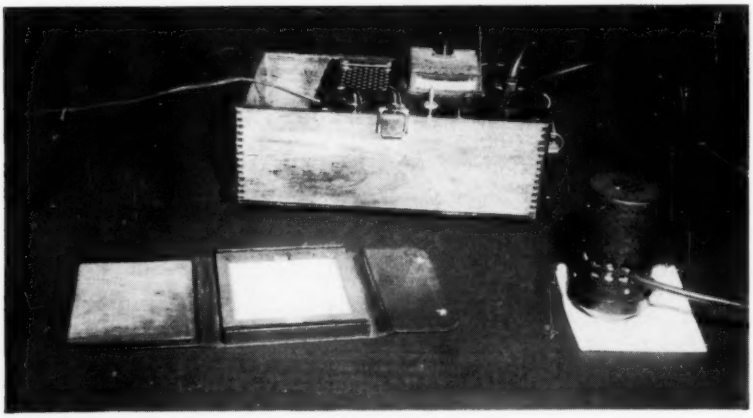

Figure 2
Photovolt photoelectric meter and standardizing plaque

4) 0.65% act ingred (1.97% sol)
5 acetate, 8 Acrilan, 9 Orlon, 7 rayon

5) 3% act ingred (9.09% sol)
4 Dacron, 6 nylon

6) 2.55% act ingred (7.72% sol)
2 wool, 3 Dynel

7) 2.25% act ingred (6.8% sol)
1 cotton

8) 1.95% act ingred (5.9% sol)
5 acetate, 8 Acrilan, 9 Orlon, 7 rayon

OPERATIONAL PROCEDURE——The procedure, equipment, and soil composition used are described in Textile Finishing Bulletin No. 148A, published by American Cyanamid Company, Bound Brook, NJ. The bulletin provides complete detail drawings and materials lists for the construction of the accelerated soil tester. This ball mill tumbling apparatus is illustrated in Figure 1.

The synthetic soil used in standard soiling tests is prepared from the ingredients shown in Table II. The ingredients are blended. The blend is placed in a large pan and dried in a forced draft convection oven for eight hours at 50°C. The dried mixture is ball milled with ceramic balls for at least 24 hours. The resulting soil is stored over $CaCl_2$ or H_2SO_4 in a desiccator.

SOILING PROCEDURE——Two samples each of the treated and untreated fabrics were cut into 5″ x 5″ squares and the reflectance of the samples was determined before soiling. The test samples were placed on the rim of the ball mill with the warp of each sample facing the same direction. Two-tenths of a gram of the synthetic soil was measured into a capsule, which is a designed part of the soiling apparatus.

The soil capsule, which contains holes through which the soil is deposited on the fabric samples, along with sixty ½″-diameter steel balls, was put into the ball mill and run for twenty minutes. The samples were removed and cleaned with an ordinary home vacuum cleaner using an upholstery attachment. Samples were cleaned by stroking the nozzle across the face of the fabrics ten times in each of the four directions. The last ten strokes were made in the same direction on each fabric sample. The reflectance of the soiled samples was then determined.

WASHING PROCEDURE——All of the swatches, weighing a total of eight pounds, were washed in a Prosperity cylinder-type washing machine having a diameter of 27″ and a cylinder length of 15 inches. The cylinder rotates at a speed of approximately 35 rpm.

The wash procedure used is given in Table III. The supplies used in this case represent a low-titre built soap and the extra alkali added on the first operation may be considered trisodium phosphate for simplification. After being washed, the fabric samples were extracted and then spread out flat to air dry. The reflectance of the washed samples was then determined.

REFLECTANCE DETERMINATIONS —— Reflectance measurements were taken with a Photovolt photoelectric meter, Model #610, as shown in Figure 2. A Tristimulus filter and a 610-D Search Unit were used. The following fabric conditions were compared:

1) Original
2) Original-soiled
3) Original-soiled and washed
4) Treated
   a) High concentration
   b) Low concentration
5) Treated-washed
   a) High concentration
   b) Low concentration
6) Treated-soiled
   a) High concentration
   b) Low concentration
7) Treated-soiled and washed
   a) High concentration
   b) Low concentration.

Difference in reflectance between the fabrics before and after each conditioning step is an indication of the relative soiling and soil-removal tendencies as influenced by the respective treatments on the various fibers treated.

TABLE II
Composition of synthetic soil

Percent	*Ingredient*	*Supplier*
38	Peat moss	Michigan Peat, Inc, Capac, Mich
17	Cement	
17	Kaolin clay, Peerless	R T Vanderbilt Co, Inc, Park Avenue, New York, NY
17	Silica (200-mesh)	Davison Chemical Corp, Baltimore, Md
1.75	Molacco Furnace Black	Binney & Smith Co, New York, NY
0.5	Red Iron Oxide N-1860	C K Williams Co, Easton, Pa
8.75	Mineral Oil (Nujol)	Standard Oil Co of New Jersey, Elizabeth, NJ

TABLE III
Washing procedure

Operation No.	*Operation*	*Time (min)*	*Level (inches)*	*Temp (°F)*	*Quantity (ozs)*	*Washing aid*
1	suds	5	10	100	1	trisodium phosphate
					2	low-titre soap
2	suds	5	6	120	1	low-titre soap
3	suds	5	6	120	0.5	low-titre soap
4	rinse	3	10	120		
5	rinse	3	10	120		
6	rinse	3	10	120		
7	rinse	3	10	110		
8	sour	4	6	100	1	sodium silico-fluoride

DISCUSSION

Reflectance measurements were made with the photometer standardized against a white plaque, which had previously been standardized at 80% reflectance. Because in some cases tests would be limited to two

thicknesses of fabric upon which to make reflectance measurements, only two thicknesses of the original and treated fabrics were placed under the search unit of the photometer for each determination. Any variation in the background below the two pieces would also influence the reflectance reading, so the standard white plate of 80% reflectance was adapted as the background for the two thicknesses of knitted fabric when the reflectance measurements were made.

Five measurements were made on each of the new and treated fabrics over a short distance in the length of the fabric. After each five measurements, the search unit was placed back on the white plaque to make certain that the instrument was still standardized and that there had been no drift in the unit, thus assuring that all of the readings were comparable.

Tables IV through IX list the average of each five reflectance readings.

After being washed, the fabric samples were extracted and spread out flat to air dry. The reflectance measurements were then repeated to compare the amount of soil removed from the treated and untreated fabrics under uniform conditions of washing and mechanical action. The average of five readings is tabulated for each fiber and treatment in Tables IV through IX.

INTERPRETATION OF DATA ——A relative measure of the amount of soiling and the amount of soil removed by washing was determined by differences in the reflectance values as follows and listed in Tables IV through IX under "Change in Reflectance":

1) Original-Treated=Effect of the treatment on reflectance value.
2) Original-Soiled original (untreated)=Relative indication of soiling characteristics of the fabric itself.
3) Treated-Treated and soiled=The effect of the particular additive on the soiling characteristics of each fiber. A smaller numerical difference between these readings will indicate more effective soil resistance.
4) Original soiled and washed-Original soiled=Relative indication of the soil removed by washing the untreated fabric.
5) Treated soiled and washed-Treated soiled=The effect of the particular additive on the soil removal characteristics of each fiber. A greater numerical

TABLE IV
Reflectance measurements for CMC-treated fabrics

				Washed		Soiled			Soiled & washed			Change in reflectance							
Test Fabric	*Original*	*Treated)—1%*	*Treated—4%*	*Treated—1%*	*Treated—4%*	*Original*	*Treated—1%*	*Treated—4%*	*Original*	*Treated—1%*	*Treated—4%*	*Original—Treated 1%*	*Original—Treated 4%*	*Original—Soiled original*	*Treated 1%—Treated 1% soiled*	*Treated 4%—Treated 4% soiled*	*Original soiled & washed—Original soiled*	*Treated 1% soiled & washed—Treated 1% soiled*	*Treated 4% soiled & washed—Treated 4% soiled*
Cotton	75	72	71	72	73	50	51	52	69	72	67	3	4	25	21	19	19	21	15
Wool	68	70	70	71	71	49	47	49	69	68	69	−2	−2	19	23	21	20	21	20
Dynel	73	71	72	72	72	50	48	50	69	67	68	2	1	23	23	22	19	19	18
Dacron	80	80	81	80	80	57	47	45	69	70	73	0	−1	23	33	36	12	23	28
Spun acetate	85	84	83	85	85	51	56	59	82	82	84	1	2	34	28	24	31	26	25
Spun nylon	81	81	81	81	81	45	48	51	78	78	80	0	0	36	33	30	33	30	29
Spun rayon	83	82	81	82	82	56	54	60	81	81	83	1	2	27	28	21	25	27	23
Acrilan	71	71	71	71	72	48	50	53	68	69	70	0	0	23	21	18	20	19	17
Orlon	83	83	83	83	83	56	54	56	79	80	83	0	0	27	29	27	23	26	27

TABLE V
Reflectance measurements for fabrics treated with Colloidal Silica A

				Washed		Soiled			Soiled & washed			Change in reflectance							
Test Fabric	*Original*	*Treated)—1%*	*Treated—4%*	*Treated—1%*	*Treated—4%*	*Original*	*Treated—1%*	*Treated—4%*	*Original*	*Treated—1%*	*Treated—4%*	*Original—Treated 1%*	*Original—Treated 4%*	*Original—Soiled original*	*Treated 1%—Treated 1% soiled*	*Treated 4%—Treated 4% soiled*	*Original soiled & washed—Original soiled*	*Treated 1% soiled & washed—Treated 1% soiled*	*Treated 4% soiled & washed—Treated 4% soiled*
Cotton	75	75	76	72	72	50	56	55	69	72	72	0	−1	25	19	21	19	16	17
Wool	68	72	71	71	71	49	56	55	69	70	70	−4	−3	19	16	16	20	14	15
Dynel	73	73	74	72	72	50	48	49	69	65	65	0	−1	23	25	25	19	17	16
Dacron	80	80	81	79	79	57	46	57	69	68	73	0	−1	23	34	24	12	22	16
Spun acetate	85	85	85	84	83	51	61	67	82	82	83	0	0	34	24	18	31	21	16
Spun nylon	81	81	82	81	80	45	57	59	78	79	79	0	−1	36	24	23	33	22	20
Spun rayon	83	83	84	82	82	56	57	60	81	80	81	0	−1	27	26	24	25	23	21
Acrilan	71	72	74	71	72	48	52	58	68	69	69	−1	−3	23	20	16	20	17	11
Orlon	83	84	85	84	85	56	58	58	79	82	81	−1	−2	27	26	27	23	24	23

TABLE VI
Reflectance measurements for fabrics treated with Colloidal Silica B

				Washed		Soiled			Soiled & washed			Change in reflectance							
Test Fabric	*Original*	*Treated—1%*	*Treated—4%*	*Treated—1%*	*Treated—4%*	*Original*	*Treated—1%*	*Treated—4%*	*Original*	*Treated—1%*	*Treated—4%*	*Original—Treated 1%*	*Original—Treated 4%*	*Original—Soiled original*	*Treated 1%—Treated 1% soiled*	*Treated 4%—Treated 4% soiled*	*Original soiled & washed—Original soiled*	*Treated 1% soiled & washed—Treated 1% soiled*	*Treated 4% soiled & washed—Treated 4% soiled*
Cotton	75	73	73	73	73	50	52	55	69	71	71	2	2	25	21	18	19	19	16
Wool	68	70	70	71	70	49	53	55	69	69	69	−2	−2	19	17	15	20	16	14
Dynel	73	72	71	72	71	50	54	55	69	69	65	1	2	23	18	16	19	15	10
Dacron	80	80	80	80	79	57	54	60	69	75	73	0	0	23	26	20	12	21	13
Spun acetate	85	85	83	84	84	51	63	66	82	82	82	0	2	34	22	17	31	19	16
Spun nylon	81	82	81	81	81	45	54	58	78	80	80	−1	0	36	28	23	33	26	22
Spun rayon	83	84	82	83	83	56	60	61	81	81	81	−1	1	27	24	21	25	21	20
Acrilan	71	72	71	71	71	48	55	63	68	71	71	−1	0	23	17	8	20	16	8
Orlon	83	84	84	84	84	56	56	60	79	83	83	−1	−1	27	28	24	23	27	23

TABLE VII

Reflectance measurements for fabrics treated with a typical cationic agent

Test Fabric	Original	Treated—1%	Treated—4%	Washed		Soiled		Soiled & washed			Change in reflectance							
				Treated—1%	Treated—4%	Original	Treated—1%	Treated—4%	Original	Treated—1%	Treated—4%	Original—Treated 1%	Original—Treated 4%	Original—Soiled original	Treated 1%—Treated 1% soiled	Treated 4%—Treated 4% soiled	Original soiled & washed—Original soiled	Treated 1% soiled & washed—Treated 1% soiled	Treated 4% soiled & washed—Treated 4% soiled
Cotton	75	70	72	70	69	50	57	50	69	69	69	5	3	25	13	22	19	12	19
Wool	68	72	73	71	71	49	50	48	69	70	71	−4	−5	19	22	25	20	20	23
Dynel	73	73	74	73	73	50	51	50	69	69	71	0	−1	23	22	24	19	18	21
Dacron	80	80	80	80	79	57	41	45	69	71	77	0	0	23	39	35	12	30	32
Spun acetate	85	86	85	86	85	51	50	52	82	82	82	−1	0	34	36	33	31	32	30
Spun nylon	81	83	83	81	81	45	46	47	78	80	80	−2	−2	36	37	36	33	34	33
Spun rayon	83	83	83	83	81	56	55	55	81	81	81	0	0	27	28	28	25	26	21
Acrilan	71	70	70	70	70	48	44	45	68	68	68	1	1	23	26	25	20	24	23
Orlon	83	84	85	85	84	56	51	48	79	81	81	−1	−2	27	33	37	23	30	33

TABLE VIII

Reflectance measurements for fabrics treated with a typical anionic agent

Test Fabric	Original	Treated—1%	Treated—4%	Washed		Soiled		Soiled & washed			Change in reflectance							
				Treated—1%	Treated—4%	Original	Treated—1%	Treated—4%	Original	Treated—1%	Treated—4%	Original—Treated 1%	Original—Treated 4%	Original—Soiled original	Treated 1%—Treated 1% soiled	Treated 4%—Treated 4% soiled	Original soiled & washed—Original soiled	Treated 1% soiled & washed—Treated 1% soiled	Treated 4% soiled & washed—Treated 4% soiled
Cotton	75	71	72	70	71	50	49	49	69	70	69	4	3	25	22	23	19	21	20
Wool	68	71	71	70	71	49	42	29	69	70	70	−3	−3	19	29	42	20	28	41
Dynel	73	73	73	73	73	50	43	37	69	70	71	0	0	23	30	36	19	27	34
Dacron	80	80	81	78	80	57	43	39	69	76	77	0	−1	23	37	42	12	33	38
Spun acetate	85	85	85	84	85	51	43	43	82	83	83	0	0	34	42	42	31	40	40
Spun nylon	81	82	82	81	82	45	35	36	78	80	81	−1	−1	36	47	46	33	45	45
Spun rayon	83	82	83	82	84	56	53	47	81	82	82	1	0	27	29	36	25	29	35
Acrilan	71	71	70	70	70	48	42	48	68	69	69	0	1	23	29	22	20	27	21
Orlon	83	85	85	84	86	56	43	41	79	83	84	−2	−2	27	42	44	23	40	43

TABLE IX

Reflectance measurements for fabrics treated with a typical nonionic agent

Test Fabric	Original	Treated—1%	Treated—4%	Washed		Soiled		Soiled & washed			Change in reflectance							
				Treated—1%	Treated—4%	Original	Treated—1%	Treated—4%	Original	Treated—1%	Treated—4%	Original—Treated 1%	Original—Treated 4%	Original—Soiled original	Treated 1%—Treated 1% soiled	Treated 4%—Treated 4% soiled	Original soiled & washed—Original soiled	Treated 1% soiled & washed—Treated 1% soiled	Treated 4% soiled & washed—Treated 4% soiled
Cotton	75	71	70	69	71	50	39	40	69	68	69	4	5	25	32	30	19	29	29
Wool	68	69	70	69	71	49	27	24	69	69	70	−1	−2	19	42	46	20	42	46
Dynel	73	74	72	74	74	50	32	22	69	68	67	−1	1	23	42	50	19	36	45
Dacron	80	80	80	80	80	57	27	21	69	71	72	0	0	29	53	59	12	44	51
Spun acetate	85	86	83	85	85	51	36	30	82	80	81	−1	2	34	50	53	31	44	51
Spun nylon	81	83	82	82	82	45	27	24	78	78	77	−2	−1	36	56	58	33	51	53
Spun rayon	83	84	83	85	84	56	45	35	81	81	81	−1	0	27	39	48	25	36	46
Acrilan	71	70	70	70	71	48	32	24	68	67	66	1	1	23	38	46	20	35	42
Orlon	83	85	85	85	85	56	29	22	79	80	80	−2	−2	27	56	63	23	51	58

difference between these readings will indicate greater ease and more thorough soil removal.

It should be noted that there are a number of other methods available for expressing this data. Formulas have been derived for converting reflectance readings into quantitative values of percent soil picked up or percent soil removed. Other investigators prefer to use simple ratios for calculating a soiling index. For purposes of this report, however, simplicity of data was considered most important to facilitate understanding. Therefore, complicated calculations have been deliberately avoided and bar graphs presented for the comprehensive comparison of data for each fabric and treatment. (Figures 3-11).

CONCLUSIONS

The results of these tests are limited in scope but offer definite indications concerning the overall problem of soiling. The effect of six common additives on the soiling and soil-removal characteristics of two natural fibers and seven popular synthetic fibers has been generally evaluated as follows:

1) Nonionic, anionic and cationic finishing agents tend to decrease the dry soiling resistance of most fibers. The cationic agent of these three has the least effect on soiling while the nonionic agent markedly increases soiling tendencies.
2) Colloidal silica-type soil retardants significantly improve the soil resistance of all fibers tested except Dacron.
3) The resistance to dry soiling of Dacron fabrics is decreased by all the treatments applied.
4) Carboxymethylcellulose as a fabric finish improves the soil resistance of spun acetate, spun nylon, and Acrilan; has no apparent effect on cotton, wool, Dynel or Orlon; and decreases the soil resistance of Dacron and spun rayon.
5) The ease with which soil can be removed from textile fibers is generally unaffected by the various additives tested. However, just as Dacron soils more easily after being treated, the dry soil is slightly easier to remove. Dry soil is also somewhat easier to remove from the treated Orlon.
6) In general, the amount of additive applied to the fabric affected the soiling characteristics

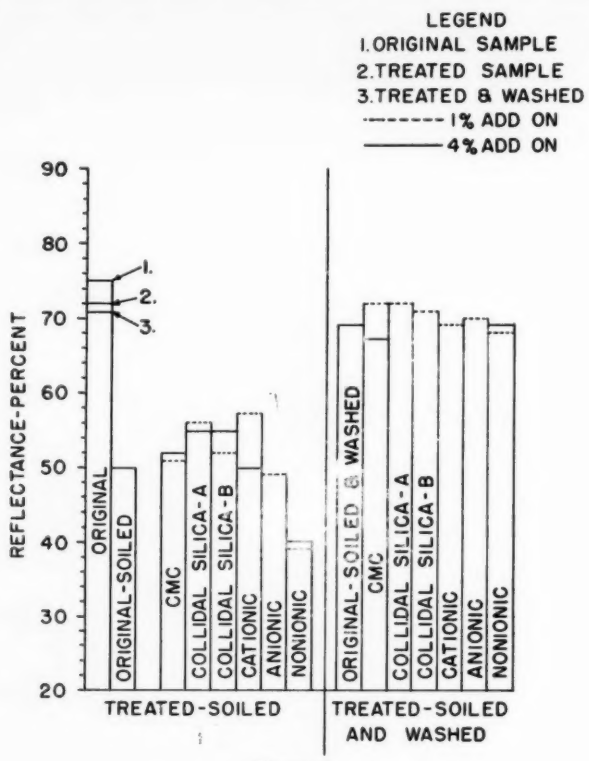

Figure 3
Cotton
Soiling and soil-removal characteristics

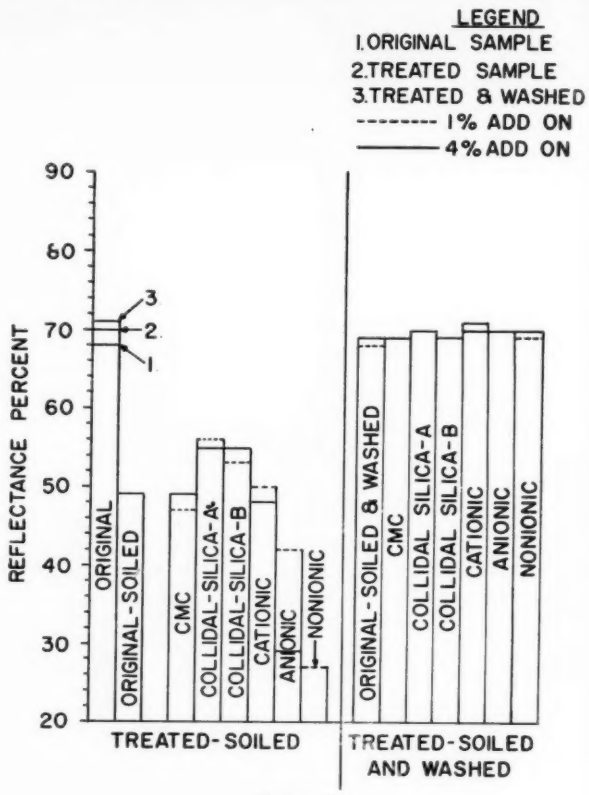

Figure 4
Wool
Soiling and soil-removal characteristics

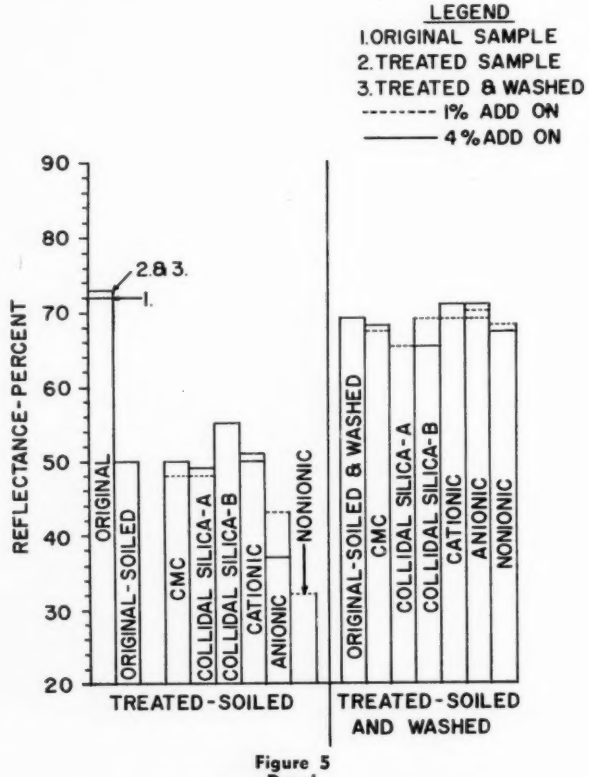

Figure 5
Dynel
Soiling and soil-removal characteristics

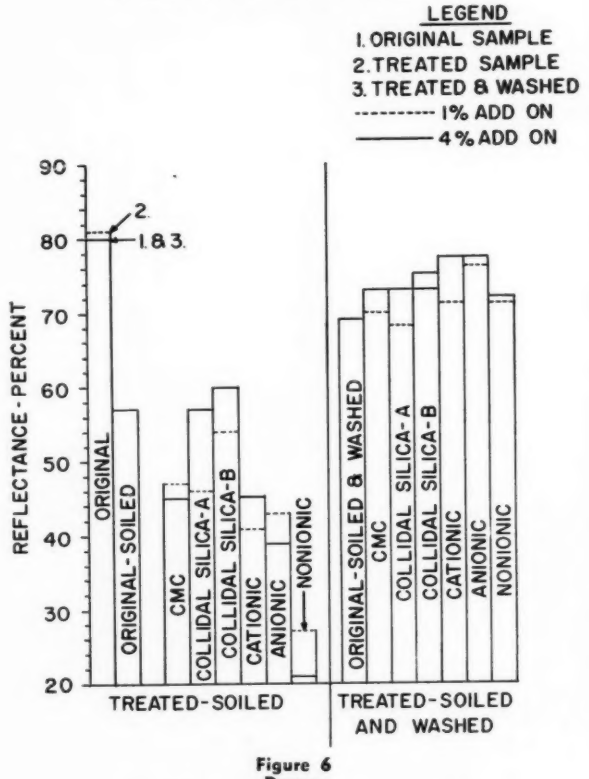

Figure 6
Dacron
Soiling and soil-removal characteristics

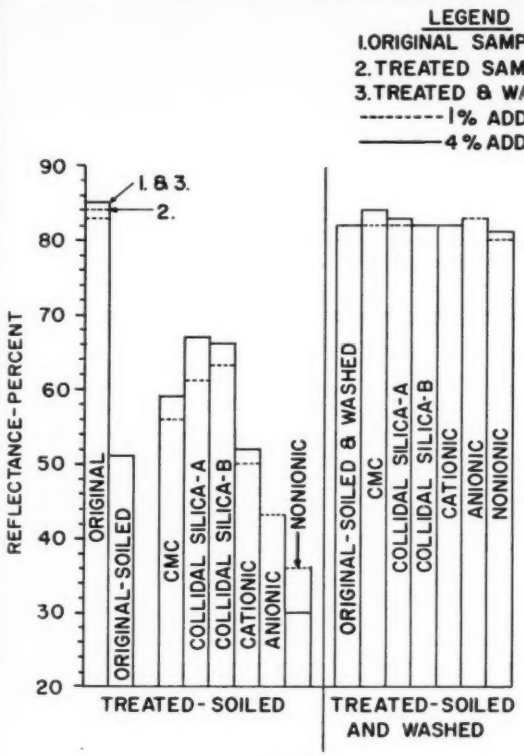

Figure 7
Spun acetate
Soiling and soil-removal characteristics

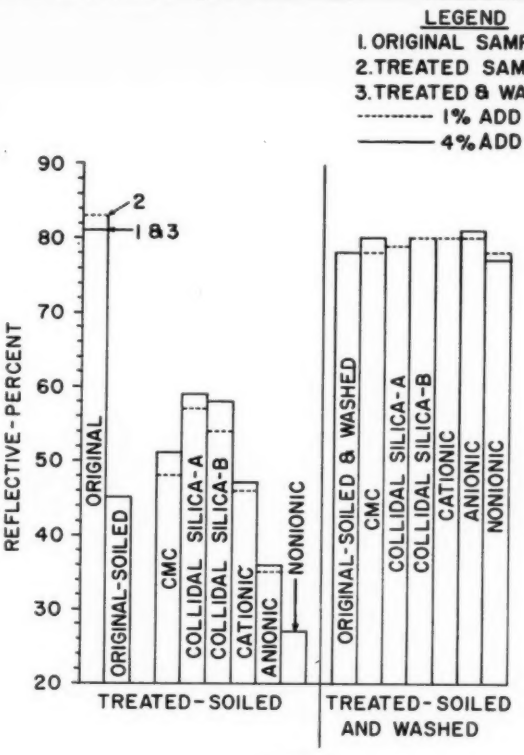

Figure 8
Spun nylon
Soiling and soil-removal characteristics

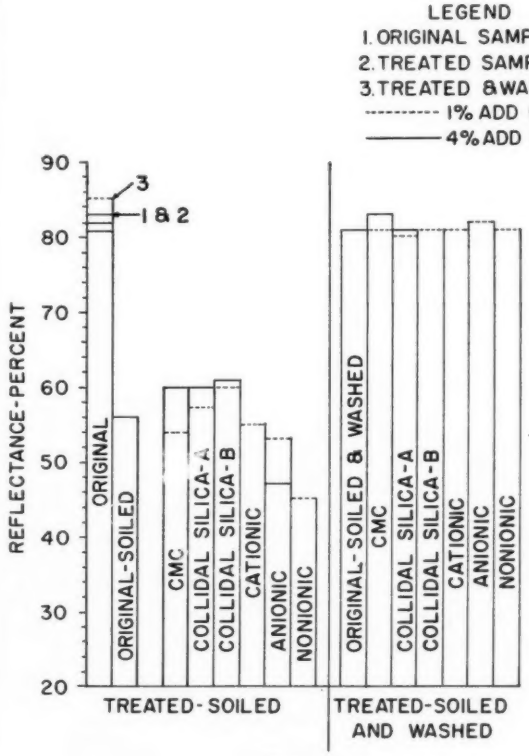

Figure 9
Spun rayon
Soiling and soil-removal characteristics

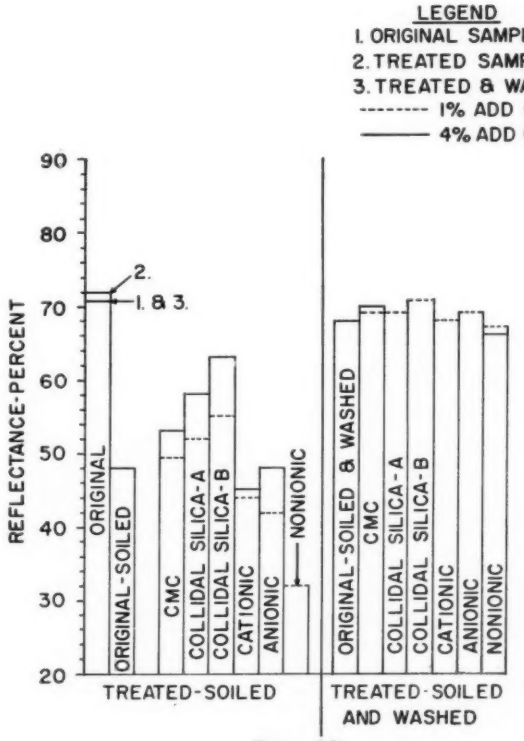

Figure 10
Acrilan
Soiling and soil-removal characteristics

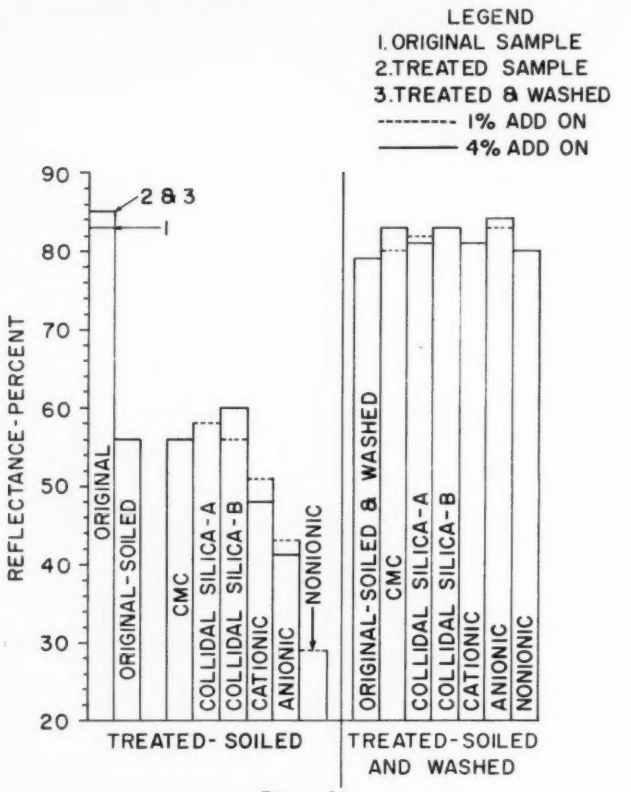

Figure 11
Orlon
Soiling and soil-removal characteristics

TABLE X
Summary of test results

Test fabric	Relative soil resistance imparted by additive: CMC	Colloidal Silica A	Colloidal Silica B	Cationic	Anionic	Nonionic	Relative ease of soil removal imparted by additives: CMC	Colloidal Silica A	Colloidal Silica B	Cationic	Anionic	Nonionic
Cotton	0	2	2	2	0	4	2	0	0	0	0	0
Wool	0	2	2	0	4	4	0	0	0	0	0	0
Dynel	0	0	2	0	3	4	0	3	3	0	0	0
Dacron	4	4	3	4	4	4	2	2	2	1	1	2
Spun acetate	1	1	1	0	3	4	0	0	0	0	0	0
Spun nylon	2	1	1	0	4	4	0	0	0	0	0	0
Spun rayon	3	2	2	0	3	4	0	0	0	0	0	0
Acrilan	2	1	1	3	3	4	0	0	2	0	0	0
Orlon	0	0	2	3	4	4	2	2	2	0	2	0

0—No effect
1—Increased
2—Slightly increased
3—Slightly decreased
4—Decreased

inconsistently and appears to be influenced by the particular fiber. Fabrics containing four percent nonionic agent, for example, usually soiled worse than that which contained only one percent. The higher concentrations of colloidal silica appear to offer greater soil resistance in most cases.

SUMMARY

Simplified and generalized, the results of these tests can be tabulated and summarized as in Table X.

ACKNOWLEDGMENTS

The Committee wishes to express sincere thanks to the many persons, both in the participating companies and otherwise, who have assisted in the work recorded. A special note of gratitude is extended to the following organizations for their cooperation and generosity of facilities: American Cyanamid Co, Bound Brook, NJ; American Institute of Laundering, Joliet, Ill; Bear Brand Hosiery Co, Kankakee, Ill; Phoenix Dye Works, Chicago, Ill; Dow Corning Corp, Midland, Mich.

ACTIVITIES OF THE LOCAL SECTIONS

Hudson-Mohawk

FIFTY-THREE members and guests attended the November 14, 1958 dinner and technical meeting of the Hudson-Mohawk Section at the Chelsea House at Tribes hill, Amsterdam, NY.

Speaker of the evening was Robert J Thomas, supervisor, textile coloration research, E I duPont de Nemours & Co, Inc, who spoke on "Dyeing Procedure and Dye Selection for Blends of Dacron Polyester Fibers and Cellulosic Fibers". Section chairman Maurice Fishman conducted an informal question-and-answer period concerning Dr Thomas' talk.

The Section will hold its next meeting January 16th at Jack's Restaurant, Albany, NY, at which time Philip B Roth, manager, Textile Resin Lab, American Cyanamid Co, will discuss "Triazine Formaldehyde Type Resins for Wrinkle-Resistant Finishes on Cellulosic Fabrics".

Metropolitan

THE Metropolitan Section held its Annual Meeting on December 12th at Kohler's Swiss Chalet, Rochelle Park, NJ, with 160 in attendance.

Vice chairman John A Komninos, presiding in the absence of Chairman Donald Marnon, extended congratulations to president-elect Weldon G Helmus, who responded with a few words to the audience.

The results of the election for Section offices were announced as follows: *Chairman*—John A Komninos, Waldrich Co; *Vice Chairman*—Percy J Fynn, J C Penney Co, Inc; *Secretary*—Richard P Monsaert Jr, American Felt Co; *Treasurer*—Richard E Miller, Eastman Chemical Products, Inc; *Councilor* — George S Wham, Good Housekeeping Institute; Executive Committeeman—Donald E Marnon, Berkshire Color & Chemical Co.

Speakers of the evening were Emmett V Martin and William R Ivey Jr of the Tennessee Eastman Co. Dr Martin spoke on "Properties of Kodel Fiber". Mr Ivey discussed "Dyeing and Finishing of Kodel Fibers and Fabrics".

AATCC Research———

DETERMINING THE PRESENCE OF MERCERIZATION IN COTTON

PURPOSE AND SCOPE———This test provides a method for the determination of the presence of mercerization in dyed and undyed cotton yarns and fabrics. In addition, the test will give an indication of the completeness of the reaction between the cotton and the mercerizing bath. The test cannot be used satisfactorily if durable finishes or fibers other than cotton are present.

PRINCIPLE ——— Carefully scoured specimens of mercerized and unmercerized cotton are immersed in separate baths of barium hydroxide solution for a definite time period. Aliquot portions of each soaking bath and of fresh barium hydroxide solution are then titrated with hydrochloric acid.

The ratio of the amount of barium hydroxide absorbed by the mercerized specimen to that absorbed by the unmercerized specimen multiplied by 100 gives the barium activity number.

APPARATUS AND MATERIALS

Burette (preferably automatic *(4)*).
Flask, Erlenmeyer, with reflux tube.
Flasks, glass-stoppered, 250-ml.
Flasks, Erlenmeyer, 125-ml.
Bottles, storage, 250-500-ml.
Beaker, 1500-ml.
Pipette, 10-ml.
Drying oven.
Hydrochloric acid (HCl) standardized ca N/10.
Barium hydroxide reagent ($Ba(OH)_2$) ca N/4 *(1)*.
Phenolphthalein.
Petroleum solvent [B P 86-140°F (30-60°C)].
Alcohol (95% ethanol or anhydrous methanol).
Enzyme, starch-solubilizing.
Soap, neutral-chip.
Water, distilled.
Cotton yarn, unmercerized, for reference (standard cotton) *(2)*.

TEST SPECIMENS———A minimum of five grams of each sample and of the unmercerized standard are scoured as directed after which a two-gram specimen of each scoured sample is weighed and placed in clean, dry glass-stoppered flasks.

Tentative Test Method 89-1958

The barium number method as a test for mercerization was originally published by S M Edelstein in Am Dyestuff Reptr **25, No. 7, P186-90, April 6, 1936. This test was developed while Dr Edelstein was a research associate of AATCC, working under the direction of the Research Committee on Mercerization. The method has been used for over 20 years both in the United States and abroad and has received wide acceptance. The method was never given official standing as an Association test and many workers have taken it upon themselves to make modifications in the test method for their own use. This often has resulted in incorrect results.**

It was felt that the method should be written up in detail and given official standing by AATCC. A committee consisting of E W Lawrence, Cranston Print Works Co; P B Stam, J P Stevens Co; and S M Edelstein, Dexter Chemical Corp, chairman, has revaluated the method and has written it up in a form which has received full approval from the three members of the committee. Interlaboratory tests on the same series of fabrics were made by the three laboratories with extremely excellent results. The results between the three laboratories are tabulated in this article.

It was recommended that the method be accepted as a Tentative Test for AATCC and such official approval was received through letter ballot in September, 1958.

PROCEDURE———

I. Scouring. The purpose of the scouring operation is to remove all extraneous matter, leaving the cotton cellulose in as pure a form as possible and without changing it chemically.

The samples to be tested (at least five g each), together with the standard unmercerized cotton, are refluxed together successively for one hour with petroleum solvent [boiling point 86-140°F (30-60°C)], one hour with alcohol (95% USP ethanol, No. 30 specially denatured alcohol, 95%, or anhydrous methanol may be used), and for one hour with distilled water *(3)*.

Following these three extractions, starches are removed as follows.

Cover the sample with distilled water containing 3% of a commercial starch-solubilizing malt enzyme solution and heat to 140± 9°F (60± 5°C). Maintain the solution at this temperature for a period of one hour. Pour off the enzyme solution, rinse, and then scour as follows.

Boil the samples together for one hour in a liter of water containing 10 g of a neutral soap and two g of soda ash. Wash repeatedly in warm water until free from soap and alkali, ie, until neutral to phenolphthalein, squeeze and dry. The samples, and the standard unmercerized cotton are dried in an oven at 212°F (100°C) until thoroughly dry. The samples are then allowed to come to to room conditions. Each sample should then be cut into small pieces (approx ⅛" sq) for subsequent weighing.

II. Testing. Prepare and test duplicate specimens from each sample. Weigh two g of each scoured sample and of the scoured standard cotton into dry 250-ml flasks equipped with stoppers. (Ground glass stoppers are recommended). Add 30 ml N/4 barium hydroxide *(4)* to each flask containing a test specimen and to two empty flasks for blank determinations. Stopper each flask immediately upon addition of the barium hydroxide and store them for at least two hours in a water bath at 68-77°F (20-25°C) (room temperature). Shake the flasks at frequent intervals. After two hours, transfer 10 ml of solution *(5)* from each container, including the blanks and titrate with N/10 hydrochloric acid, using phenolphthalein as an indicator.

Using the titration figures, determine the ratio of barium hydroxide absorbed by a mercerized specimen to that absorbed by the unmercerized standard. Multiply this ratio by 100 to *obtain the barium activity number.*

Example: 10 ml of barium hydroxide solution (blank) required 24.30 ml of N/10 HCl. Ten ml of barium hydroxide from an unkown sample of cotton required 19.58 ml of N/10 HCl. Ten ml of barium hydroxide from unmercerized cotton

BARIUM NUMBERS

Interlaboratory tests on mercerized fabrics furnished by Cranston Print Works Co

Cloth	Stevens	Cranston	Dexter A[1]	Dexter B[2]	Dexter C[3]
80 x 80 — 35° Tw	118	118	117	120	114
80 x 80 — 55° Tw	130	131	128	132	125
108 x 58 — 55° Tw	141	145	143	143	140
136 x 64 — 55° Tw	122	123	123	122	120
88 x 50 — 55° Tw	139	140	136	140	133

[1]Fabrics scoured by Dexter, unmercerized 80 x 80 as standard.
[2]Fabrics scoured by Stevens, unmercerized 80 x 80 as standard.
[3]Fabrics scoured by Dexter, 40/2 combed mercerized yarn as standard.

(standard) required 21.20 ml of N/10 HCl. Therefore the barium number of the unknown sample is—

$$\frac{24.30 \text{ minus } 19.58}{24.30 \text{ minus } 21.20} \times 100 = 152$$

Barium numbers should be run in duplicate and should be reported separately. Duplicate runs should not be off by more than four units. The titrations should be within .1 of a ml for check results. Skilled operators can estimate to within .05 ml. A difference of more than four units between duplicate runs indicates inaccuracy in running the tests.

A barium activity number in the range of 100 to 105 indicates no mercerization. A barium activity number above 150 indicates substantially complete reaction between the cotton and the mercerizing bath. Intermediate numbers indicate either incomplete reaction or use of a weak mercerizing bath.

NOTES———

(1) The barium hydroxide reagent is prepared by shaking distilled water with slightly more than the calculated quantity of barium hydroxide, allowing it to stand overnight in a stoppered bottle, and then siphoning the clear solution into a clean storage bottle.

(2) Unmercerized (standard) cotton skeins (40/2 ply) as used for the Draves Wetting Tests are particularly satisfactory. They may be obtained from Testfabrics, Inc, 55 Van Dam Street, New York 13, NY.

(3) If it is known that all samples under test do not contain finish or starch, then the scouring procedure may begin with the soap-and-soda-ash treatment. If one sample requires solvent extraction and the enzyme treatment, then all samples including the standard cotton must be treated together with the complete scouring procedure to insure the same final state for the whole set of samples.

(4) An automatic burette is most convenient for the addition of the barium hydroxide solution to the specimens. The air outlet must be equipped with an absorption tube containing soda lime to remove carbon dioxide. The latter must not be allowed to enter any burette that might be used, because formation of barium carbonate not only affects the concentration of the reagent but forms a film which interferes with burette readings. A cork is fitted to the bottom of the burette in such a manner that the 250-ml Erlenmeyer flasks containing the specimens under test are locked into place without exposure to air during the addition of barium hydroxide. The barium hydroxide solution should cover the specimens, tilting the flasks if necessary to accomplish this end.

(5) For the removal of 10 ml of barium hydroxide when equilibrium has been reached, a 10-ml pipette is used. The same pipette, burette, etc, should be used for the whole set of determinations and the same technique for emptying or filling pipettes and burettes should be used on each determination. The hydrochloric acid burette is also equipped with a cork to which the 125-ml flask can be attached during the titration of the 10-ml aliquot portions of barium hydroxide, thereby eliminating titration errors resulting from carbon dioxide absorption by the alkaline solution. In removing the 10-ml aliquot portion of barium hydroxide from flasks containing specimens, the operator should use the end of his pipette to push the cotton against the wall of the flask and to express the excess liquor. In this way, a larger amount of the solution will be available for drawing up into the pipette.

Address before the Southeastern Section———

(Continued from page P926)

terms of occupancy available, and at the same time, located where its needs are best satisfied. But this entire situation is one for Council action and not for any single official.

Another item that I feel is important to our Association is a proposal, now before Council, to establish an Executive Committee of the Council. We have a governing board of 56 members. Although there are over 20 council committees performing administrative functions, I am of the belief that an Executive Committee would give the Council and the Association as a whole, closer and more coordinated control of AATCC affairs.

If any of your companies were run by 56 people, you probably couldn't stay in business. I am convinced that we must have within the Council a small group of elected officers who can execute Council policy and translate it into sound management practice. The president, the treasurer, the executive secretary and various committee chairmen need to look to an authoritative body, with a full working knowledge of current problems, to help them to carry out their responsibilities. This is one of the things I have introduced with the support of the Southern Sections, and it is another example of the fine cooperation I have had from you.

I must at this time, in all fairness, and particularly because of his modesty, publicly acknowledge the immeasurable help I have received from the able, competent and willing George P Paine. I again will quote from a letter, this time from Charles Sylvester which expresses better than I can, my feelings.

"Dear George: Sometimes I think we tend to take a good thing for granted and I would be very much amiss if I did not pay tribute to the outstanding job done by our executive secretary, George Paine, both in regard to the Research Symposium in Chicago and our Research Program at Lowell. George has that exceptional and valuable knack of getting things done promptly and efficiently with a minimum amount of disturbance. I know you will agree that his efforts at AATCC headquarters in Lowell have greatly contributed to the coordination and effectiveness of our research program."

I could not close without a word of appreciation to Gillie Smith, Southern Regional vice president, for the help he has given me during my administration, and to your chairman, Bill Griffin, and to your councilors, Bill Fayssoux and Howard McCamy. The past two years have been my best years, and I hope that the many wonderful friendships I have made here and elsewhere will continue long into the future.

Thank you very much for giving me this opportunity to come here to address your meeting and the honor of presenting certificates to your past chairmen. It has been a great honor.

Committee on Colorfastness to Pleating———

COLORFASTNESS TO PLEATING

Tentative Test Method 31-1958

COMMITTEE
J E MEILI, chairman
C W SAALFRANK, secretary
W ANDERSON
V H FORSYTH
H MOORE
F C RIPPNER
V S SALVIN

For two years the Committee held several meetings to evaluate tests run by representative laboratories on a variety of fabrics made from different fibers and blends. A survey was made of the pleating industry to determine its requirements and practices.

On the basis of the information obtained, the Committee drafted a proposed "Tentative Test Method 31-1958" which was approved through letter ballot by the AATCC Technical Committee on Research in March, 1958.

The new tentative test method, which specifies a range of three steam pressures dependent upon the various fiber requirements, replaces Tentative Test Method 31-1957, which specified one pressure. Evaluation of color change is made after a two-hour period instead of the optional range of three time periods formerly specified.

PURPOSE AND SCOPE———This test measures change in shade of dyed textiles which are to be subjected to a treatment with steam under pressure. It is applicable to textiles intended to be used in pleated clothing.

PRINCIPLE———A test specimen sandwiched between two sheets of filter paper is formed into pleats and subjected to steaming in a closed container. Three conditions of test cover the permissible heat requirements of various fibers.

APPARATUS AND MATERIALS

Cottage steamer, or its equivalent. Any apparatus may be used which will withstand 20 lbs steam pressure, with arrangement that the specimens do not come in contact with water. A sufficient volume of steam should be available to permit the pressure to rise to 20 lbs within five minutes. Pressure cookers with perforated false bottoms and the ordinary laboratory pressure autoclaves have been used successfully for this test.

International Geometric Gray Scale *(1)*.

TEST SPECIMENS———All specimens should measure at least 2″ x 4″.

PROCEDURE———Sandwich the specimen between two sheets of soft filter paper and pleat together with the paper into approximately ½″ pleats. To prevent unfolding of the pleats, tie the package moderately tight with thread. Expose the pleated package in a current of steam for 20 minutes. Adjust the exhaust valve of the steam box so that the required pressure is maintained during the whole procedure.

Three conditions of tests are available, depending upon the degree of severity desired. They are:

Test I— 0 lbs steam pressure
Test II—10 lbs steam pressure
Test III—20 lbs steam pressure

EVALUATION FOR ALTERATION IN COLOR (SHADE AND STRENGTH)———The test specimen is evaluated for change of color after a cooling-off period of 2 hours.

The effect on the color of the test specimen can be expressed and defined by reference to the International Geometric Gray Scale *(1)*.

Class 5—negligible or no change, as shown in Gray Scale Step 5.

Class 4—a change in color equivalent to Gray Scale Step 4.

Class 3—a change in color equivalent to Gray Scale Step 3.

Class 2—a change in color equivalent to Gray Scale Step 2.

Class 1—a change in color equivalent to Gray Scale Step 1.

The test number used must be stated, in reporting the colorfastness to pleating ratings.

NOTE———

(1) For procurement see Table I, page 54, 1958 *AATCC Technical Manual*. For description and instructions, see page 80, *ibid.*

TO ensure that the activities of your section receive proper publicity in the *Proceedings*, it is desirable that material be submitted direct to American Dyestuff Reporter, 44 E 23rd St, New York 10, N Y.

ADVANCE NOTICES OF MEETINGS———Copy must be submitted *at least two weeks* prior to the publication date. ADR is published on alternate Mondays. It is urged that these dates be taken into consideration when copy is submitted.

Advance notices should include the date and site of the meeting; the speaker's name, position, business affiliation, and subject; a short abstract of the paper (optional); details of additional meeting highlights, eg, nominations or election of officers, special awards, activities of Sectional committees, etc.

MEETING REPORTS———Complete reports should be submitted as soon as practical after a meeting. Information should include attendance figures; captioned photographs of meeting principals (speaker, section officials, etc); and any additional points not covered in the advance notice. An extensive resume of the speakers' remarks is not necessary if the paper is to be submitted for full publication in the *Proceedings*.

PAPERS———Two copies of each paper presented before local sections should be sent to the offices of the American Dyestuff Reporter. It is very important that every speaker be acquainted with the "Notice to Authors", which appears periodically in the *Proceedings*. Additional copies of said notice will be sent to section officials on request.

It is imperative that each Section appoint an official whose responsibility it is to see that the speaker's remarks are submitted. In cases where prepared manuscripts are not immediately available to the Section official, it may be necessary to acquaint the author with the address to which he should send his material when it is finally prepared.

In cases where the material is extemporaneous (panel discussions, question-and-answer periods, open forum, etc) it is the responsibility of the Section to provide for stenotype service, so that a complete record may be available.

PRESENTATION OF A PAPER BEFORE A LOCAL SECTION DOES NOT GUARANTEE PUBLICATION IN THE PROCEEDINGS, AS THE FINAL DECISION RESTS WITH THE AATCC PUBLICATIONS COMMITTEE. However, most papers will be acceptable provided they conform in content and layout to established practices of AATCC.

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P J WOOD

WORDS

As we write this monthly quota, something reminded us that this is the 200th anniversary of the birth of that extraordinary lexicographer and writer, Noah Webster, producer of the world's first American Dictionary.

We owe a big debt of gratitude to Noah. He gathered together all the words he knew and put them in a book so that they would not be lost. If it hadn't been for Noah, we might have run out of words by this time.

When one considers that there are more than 300,000,000 people in the world that speak English (probably even more since we looked up the source from which we culled this information; this morning's paper says the population of the US is 178,000,000 today), it is understandable that they need a lot of words.

But the pundits tell us that few people use more than 3,000 words, and that most people use roughly 600 words to express themselves in daily living.

So, it is more than mildly surprising to find so many individuals who, to the outward eye, do not seem particularly pushed for time, abbreviating their language by dropping g's just as freely as they drop litter in the streets of most of our larger cities - comin' and goin', eatin' and drinkin', - and people who, like the litterbugs, should really know better.

In England, we seem to remember encountering a certain class of folks who deliberately cultivated this habit of g dropping, an affectation they seemed to think was smart. And these were the literate, mind you, not the illiterate, whose favorite pastime seems to consist in rifling the h's from unsuspecting aspirated words and playfully adding them to unaspirated vowels, the result being, to say the least of it, somewhat bizarre; f'rinstance, take the case of the bus conductor who, on being reminded that he had dropped something when he called the name of the street 'olborn (Holborn) wittily replied that he would pick it up again at Hoxford (Oxford) Street.

ANNIVERSARY

The Turkish Republic has been established 35 years this year. It was organized and carried on for many years by the late Mustafa Kemal, afterwards known as Kemal Ataturk. Before that, we seem to remember this now progressive country being referred to as "the sick man of Europe". There was a time when our own country was only 35 years old and some people were saying it could never last. Let us hope for our Turkish neighbor that it may last as long as this country has, and that both of them may last as long as time.

Mustafa did a good job of founding; as Elmer would say in his quaint way, "Attaboy Ataturk!"

ACCOLADE

Without permission we take the liberty of quoting from The Phi Psi Quarterly the words of Bertrand W Hayward, president of Philadelphia Textile Institute - words of welcome on the occasion of the 55th Convention of this well-known fraternity -

> "Popularity is cheap and easily won, and easily tarnished. Courage is hard to win, difficult to retain, but it makes a man. This is, I believe, why colleges and fraternities exist - to make men, to make men of courage. May we create some clear candle to help hold back the darkness of the forces that would level us off at some easy level of attainment. Such efforts may often be bitter, they may not even win, but they can be worthwhile in themselves. I do not know that I am, even for an instant, such a man of courage. I only know such men are sorely needed."

in our opinion, Bertrand, you are such a man of courage. God bless you.

MOTHPROOFING

Doesn't it seem odd that Dieldrin, the well-known insecticide, should have been invented here and developed as an insect spray for crops and then we had to leave it to the Australians to show us how it could be used as a permanent mothproofing agent for wool? And a good one too according to J P (evidently a stereoisomer in the way of intials) Redston, who told us all about it at one of the sessions of the AATCC Convention last October. Incidentally, we weren't allowed any question-and-answer period after his address, as he talked too long, but we might add that we would sooner have J P talk too long than

a lot of other people we might mention, but won't.

In the biographical blurb we note that this speaker came from Stroud, the same West-of-England town as our classmates Reggie Steele and Sam Phipps. They told us about Cirencester, on the other side of the river from Stroud. It was from them we learned that the correct pronunciation of the name of this ancient Roman town (circa BC 55) is Sisseter. If there had been a Q & A period, we would have liked to have asked J P why.

MEMORABILIA

Recently, Dick Jones took us up the Hudson River to see our old friend Rudy Funke at Putnam Chemical Company in Beacon, N Y.

Rudy we have known well and favorably since we first met him in AD 1919 in that salubrious district of Brooklyn known as Canarsie, that favorite resort of mosquitoes and establishments emitting various objectionable effluvia. One of the latter was the dyestuff factory of Willy Beckers, where Rudy and Carl Funke worked. Along with them were many old-timers of the dyestuff elite, among whom may be mentioned Felix (Bob) Bume, Kelly Zillesen, Carl Puller, Dyer Moss.

Willy Beckers' "Fabrik" was eventually incorporated into the now National Aniline, Dr Willy himself finally becoming president and, we believe, chairman of the board. Our friends above were scattered to the four winds of the earth.

At this same merry meeting we made the acquaintance of two charming representatives of the Badische Anilin- und Soda-Fabrik of Ludwigshafen, where we spent a happy summer long years ago. They are Messrs W Ulbricht, who like Rudy, is a vice president of Putnam, and G Ungewitter, technical director of Putnam; the latter spent the greater part of his life, so far, in the Orient.

Some of our time we spent in reminiscing about that good, wholesome luncheon we used to eat daily in the Kasino, run by Badische for the Beamten of the company, which, in our time cost all of 35 pfennig (a pfennig is a hundredth part of a mark and a mark was approximately a quarter in our money). We remember that we had a big plate of soup, followed by the soupmeat, a boiled potato and plenty of horseradish sauce, topped off by a Braten with gehackte Spinat (spinach).

If a Nachtisch (dessert) was desired, it cost 15 pf extra, quite a consideration in those more impecunious days.

Our new friends told us that the prices at the Kasino were still very reasonable and the cuisine just as excellent as of yore. It is our considered opinion that this restaurant activity is a nonprofit organization, which we would here describe as a "Fringe-Benefit".

BEATAE MEMORIAE

Aye, and they are blessed memories, those Christmasses of long ago. They started, as did other feasts and holidays, with the singing of the old school song "Dulce Domum', the words of which, barring unavoidable lack of means of checking, went as follows:

"Concinamus, O sodales
Eja quid silemus,
Nobile canticum
Dulce melos domum
Dulce domum resonemus."

But at no term-ending was it sung with more feeling or more vociferously than at the "Breaking up" for Christmas.

Home for the holidays and the holy day, the anniversary of that day when mankind, or those of them that would accept it, received the greatest gift the world has ever known.

We are afraid that many of us are apt to estimate the happiness of Christmas by value received rather than by value given, unappreciative of the wonderful privilege this season offers of making gifts as a token of acknowledgment of the Gift of all gifts bestowed on man those two thousand years ago.

Remember the words of Edmund Vance Cooke:

" 'Tis not the weight of jewel or plate
Or the fondle of silk or fur;
'Tis the spirit in which the gift is rich;
As the gifts of the wise ones were;
And we are not told whose gift was gold
Or whose was the gift of myrrh."—Q.E.F.

Abstracts

Fiber Damage in the Stock-Dyeing of Wool

Gullbrandson, B, *Textile Research J* **28**, 965-8, November, 1958.

It is a common experience that stock-dyeing of wool, especially in dark colors, increases the brittleness of the fibers. There is a reduction of the fiber tenacity, which is usually ascribed to a damaging effect of the dye.

The effects on mechanical properties of fabrics and yarns by dyeing have been carefully investigated by others. These experiments indicate that little damage is done under common dyeing conditions. The effects of dyeing on loose wool, however, have been little investigated. But there have been observations that top-dyeing can be done without appreciable damage in those cases where stock-dyeing under the same conditions causes great damage.

The investigations of the author, which are described in great detail, confirm earlier observations that loose wool, but not wool top, is damaged in dyeing. They disclose that most of the reduction in fiber strength in stock-dyeing is due to setting of bends and curvatures in the packed fibers by the hot water treatment. Such set fiber bends are nonuniformly strained by tensions, and thus break under smaller loads than fibers set in the straight state.

To show that the dye, or some other dyebath component, is not responsible for the fiber damage in stock-dyeing, it has been demonstrated that a treatment with hot water alone is sufficient to cause fiber damage.

The author states that fiber damage in stock-dyeing can be reduced by lowering the temperature of the dyebath or by dyeing for a shorter time.

Seventeen references to the literature are cited.

Polyolefin Fibers in Textiles

Erlich, V L, Papers of AATT, *Modern Textiles* **39**, 59-66, November, 1958.

The olefins are compounds of carbon and hydrogen which, unlike the paraffins, are "unsaturated"; ie, they have two carbon atoms connected by a double bond. This double bond can be opened or activated to connect a carbon atom of one molecule to an unsaturated carbon of a second molecule, and then to a third, and so on, to form polyolefins (ie, polyethylene). The carbon chain can theoretically be lengthened without limit; for fiber production, polyolefins have between 1000 and 5000 carbon atoms in the chain.

Fibers are produced from the polyolefins by melt-extrusion. The filaments so formed have no strength, and must be cooled below the melting point and then drawn, so as to orient the molecular chains parallel to the filament axis. In this way strong filaments are formed.

The so-called "linear" or "isotactic" polyethylene made today, in which all the carbon atoms are in a straight line, has quite different properties from the polyethylene formerly made, which was of the "branched" type. The length of the molecular chain and the degree of crystallinity of the compound are factors which determine the properties of the fiber (eg, tensile strength, flexibility, etc).

The polyethylene fibers of ten years ago had insufficient strength and a low melting point, and could not be dyed by regular methods. Filaments of approximately 650 denier were produced for use in industrial fabrics and other applications calling for heavy-gauge fibers. Present-day fibers are down to 40 to 100 deniers, with greatly increased tenacity, but 5-denier fibers are not yet available.

The polyolefin fibers (polyethylene, polypropylene) have a water absorbency of 0. They are chemically inert and odorless, resist mildew, and are stable when stored at room temperature. They burn slowly, but addition of retarding agents (eg, chlorinated waxes) improves their flame resistance. They have high electric insulation properties. Dyeing is done by incorporating selected pigments in the melt before extrusion.

The author suggests as suitable end-uses for these fibers seat covers and fabrics for outdoor furniture. Indutrial uses include filter-cloths, anode bags in electroplating, and ropes. Polypropylene has the advantage over polyethylene of a somewhat higher melting-point (it softens at 300-310°F).

Research on these new fibers is going on both here and in Europe, to improve their properties.

Treatment to Improve Heat Resistance of Nylon

Anon (Brit Nylon Spinners Ltd), *Textile Mfr* **84**, 582, November, 1958.

Substantial improvement in the life of nylon fabrics to be used at high temperatures can be obtained by the introduction of special finishes. These new treatments have been developed primarily to meet the needs of the laundry industry; trials on nylon press cloths have shown that their life can be increased by up to three times. Applications of the treatments in other industries are expected.

Three processes, all of approximately equal value, are recommended:

1) For 10 gals of final impregnating liquor, 6.5 oz of 40% formaldehyde and 6.5 oz of tannic acid are mixed and boiled together for 3-5 min. A low mw formaldehyde-tannic acid condensation product is formed. This is added to the water. The fabric is impregnated with this solution on the jig at the boil for three to five ends, dried, and dry heat-set.

2) Same as (1) but with the addition of 4 oz pyrogallol.

3) A 0.5% solution of tannic acid containing 4% formic acid (on weight of fabric) is prepared. The fabric is impregnated with this solution on the jig for 30 min, and is re-impregnated in a fresh bath with 0.5% tartar emetic solution for 15 min at the boil, followed by heat-setting.

Results of laboratory and practical trials with these finishes are reported, showing the extent of the improvement. Although the treatments turn the fabric a brown shade, this is not considered a disadvantage for laundry purposes.

Dyeing and Finishing Dacron Type 64 Polyester Fiber

Anon, *Dyes & Chem Tech Bull (du Pont)* **14**, 114-35, Sept, 1958.

Du Pont's new polyester fiber, designated Dacron Type 64, combines improved pill resistance with good dye affinity. These properties make it suitable for usage in the worsted-type suiting field. In blends with rayon or wool it supplements the older Dacron Type 54, but is unsuitable for blends with cotton because of its sensitivity to strong alkalis. For this purpose Dacron Type 54 should still be used.

Three classes of dyes are recommended for use on Type 64: disperse dyes, disperse-developed black, and cationic dyes. Because the rate of dye absorption on Type 64 under normal dyeing conditions is usually too low for satisfactory mill operation, special dyeing procedures are necessary to increase the rate of dye absorption: high-temperature (pressure) dyeing and carrier dyeing. Light shades may be dyed by conventional methods, but heavy shades require temperatures up to 250°F. For carriers, Dowicide A or

Latyl Carrier A may be used.

Lists of suitable disperse and cationic dyes and full particulars for conducting the dyeing operations are included.

Effect of Creaseproofing Agents on Lightfastness of Sensitive Dyes

Goldstein, H B, *Textile Bull* **84**, 69-72, October, 1958.

In selecting a resin to produce crease resistance or wash-wear properties, the finishing plant must choose a resin which will fulfill, to the desired extent, certain requirements, such as chlorine resistance, permanency of finish, wet-soiling properties, utility in mechanical finishing operations, etc. In addition, the author points out that the fastness to light of several classes of dyestuffs is known to be greatly affected by certain types of finishing agents, including some of the conventional types of creaseproofing agents. The dyes which show the greatest sensitivity are direct, diazotized and developed, and reactive dyes, as well as a few selected vats.

The author discusses the various types of resins now being employed for creaseproofing, and gives them a relative ranking as regards their effect on lightfastness, as follows: without exception, dimethylol cyclic ethylene urea has the greatest adverse effect; guanyl urea-formaldehyde resin is next in its effect; the inclusion of copper compounds in such treatments reduces the loss in lightfastness substantially. With still less effect, there is a miscellaneous group, ie, melamine formaldehyde resins, triazones, and non-nitrogenous finishes. While their effect is not severe, these finishes consistently cause some deterioration in lightfastness. For creaseproofing treatments which have little or no adverse effect, the author lists a chlorine-resistant dimethylol cyclic compound (a recent development), urea-formaldehyde resins, and tetramethylol acetylene diurea. In many instances, he says, these compounds actually improve lightfastness as compared to the untreated dyeings.

He states that the fact that several of these compounds contain methylol groups does not cause fading *per se*.

The author found a surprising uniformity in the reaction to the various resin treatments of the four classes of dyes tested. He concludes that these effects are due to some light-screening phenomenon, such as "radiation antagonism," and probably not due to a reaction between the resin and the dyestuff.

Disperse and cationic dyes in the presence of a carrier can be used for dyeing the Dacron in blends of Type 64 and wool. Level-dyeing, neutral-dyeing, chrome or premetallized acid dyes can be employed for the wool, depending on the shade desired and the fastness required.

For blends of Type 64 and rayon the Dacron is dyed first with disperse or cationic dyes, and the rayon later in a separate bath; or a one-bath method may be used (with disperse dyes).

Full particulars are given for spot removal, scouring, carbonizing, crabbing, fulling and drying fabrics containing Type 64.

It is noted that Dacron Type 64 can be heat-set at lower temperatures than those used for Type 54. This property is useful in stabilizing yarn twist and in removing residual shrinkage.

Scouring of Wool-Terylene Mixture Cloths

Hartley, R S and Elsworth, F F, *J Textile Inst* **49**, P554-62, October, 1958.

Appreciable quantities of Terylene polyester fiber are being processed in England on the worsted system in blends with wool for the production of suitings. Wool/Terylene worsted yarns are obtained by blending oil-combed dyed wool tops with dyed Terylene tops. The wool usually contains 3-4% by weight of a fatty combing oil, whereas no fatty oil is present on the combed Terylene, in which the amount of solvent-extractable matter does not normally exceed 0.7%. Some of the oil on the wool transfers to the Terylene after the fibers are blended. Laboratory scouring experiments and microscopic observations of oiled fibers in detergent solutions show that the combing oils at present used in the worsted industry, although readily removable from wool and many other fibers by simple scouring methods, are much less readily removable from Terylene. Also, the oil remaining in the Terylene is usually highly colored by association with the disperse dyes used for dyeing the Terylene. It is noted that the combing oils are more readily removed from Terylene as their state of oxidation advances (eg, by exposure to light).

The authors suggest two possible ways of improving the scouring of these blends so as to remove the oil from the Terylene: 1) by modifying the scouring routine, by the addition of suitable reagents capable of promoting easy scouring; 2) by modify ing the combing oil by adding to it suitable reagents capable of assisting the scouring action.

Experiments with method 1) ran into difficulty in introducing the necessary quantity of assistants, and satisfactory results have not yet been obtained. Working with method 2), however, an oil was prepared consisting of 70 parts of a combing oil (mixture of processed sperm and castor), 10 parts of a nonionic surface-active agent miscible with oil but only slightly soluble in water, and 20 parts of another nonionic surfactant soluble in water and only slightly soluble in oil. When this blend was used instead of the combing oil alone, it was found that the addition of the surfactants resulted in a marked improvement in scouring performance.

Best Wishes for 1959

American Dyestuff Reporter

Does Drycleaning Wear Out Clothes?———

(*Concluded from page 926*)

caused greater shrinkage than wetcleaning.

E) Morrison, Ward, Davison and Macormac *(9)* reported recently on the physical and chemical characteristics of twenty-five suiting fabrics composed of wool, and wool combined with mohair, nylon, and rayon. The fabrics in this study were woven to specification. To supplement the laboratory data, the Institute of Home Economics has under study uniforms that are being worn and drycleaned. Evaluations are being made after wear periods. During the four seasons of wear the uniforms have been drycleaned sixty times.

In another study underway by the Institute of Home Economics, men's trousers made of worsted serge are under scrutiny. These trousers have been worn by college students. At the end of twenty-two to twenty-three weeks of actual wear, 95% of the trousers were subjectively evaluated as worn out. These studies have not reached the publication stage, but preliminary data indicate that drycleaning alone has little or no effect on the physical properties of the fabrics.

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News of the Trade

Textile Seminar for Retail Executive

The Textile Section of the New York Board of Trade, in association with the National Retail Merchants Association and the New York Board of Education will sponsor a Textile Seminar for Retail Executives beginning next month.

The fourteen-week seminar is designed to provide the retail executive with specific information, which will enable him to plan more effectively and to educate his staff and customers.

Commencing Tuesday evening, January 20th, 1959, the seminar will meet weekly at the High School of Fashion Industries. Nationally known speakers and panels will discuss various aspects of textiles. The first session will be entitled, "Some Thoughts On The Composition And Economics Of Textiles Next Year And The Next Decade," and will be presented by a panel composed of R Buford Brandis, chief economist, American Cotton Manufacturers Institute, Inc; Jackson E Spears, vice president, Burlington Industries, Inc; Edward T Powers, director, market research and product development, The Chemstrand Corp; and Walter A Schaefer, director, marketing research, Cone Mills, Inc and chairman, New York Textile Analysts Group.

Thomas F Parks, chairman of the Education Committee, described subsequent sessions as "lectures and panels covering all aspects of fibers, construction, finishes, standards, promotion and marketing." The concluding meeting on April 28th will feature a discussion by a panel representing the industry of "How To Translate Greater Textile Knowledge Into Greater Textile Sales At Retail."

The fee for the course is 25 dollars. Registrations are available and may be made through William Burston of the NRMA.

Carbide Moves Atlanta District Office

The Atlanta District Office of Union Carbide Chemicals Co, division of Union Carbide Corp, has been moved to 1371 Peachtree Street, NE, Atlanta 9, Ga. The new telephone number is TRinity 3-2241.

OBITUARY

EARLE D McLEOD

EARLE D McLEOD, 48, research chemist and production manager of Arnold Hoffman & Co, Inc, died November 15 at Massachusetts General Hospital, Boston.

Mr McLeod, who served as chairman of AATCC's Intersectional Contest in 1955, was named assistant to the president of AHCO in 1958. From 1942 to 1948 he was director of research.

He is survived by his father and two sons.

RAYMOND L MATTHEWS

RAYMOND L MATTHEWS, a member of the sales development staff of the Textile Chemicals Dept, Rohm & Haas Co, died December 8 as a result of a cerebral hemorrhage.

Mr Matthews joined Rohm & Haas in February 1956. Prior to that time he was employed by General Dyestuff Co, Crompton-Shenandoah Co, and Sidney Blumenthal & Co, Inc at the Rocky Mount, NC, mill.

He is survived by his wife and two daughters.

Bennett-Rosendahl Co, Chemiform Institute Formed

Harry Bennett and Edward Rosendahl, for the last thirty years president and executive vice president respectively of Glyco Products Co Inc, and recently having sold their interests in that company, have opened offices in the Coliseum Towers, 10 Columbus Circle, New York 19, NY, under the name of Bennett-Rosendahl Co Inc.

They will act as business advisors to small- and medium-size chemical companies in business matters connected with the running of a chemical company.

Included in the service will be advice on organizing and handling a sales department, setting up a purchasing department, publicity, catalogues, personnel problems, plant safety departments, foreign agencies, public and private financing and preparing companies for sale or merger.

With Mr Bennett as director, and Mr Rosendahl as associate director, The Chemiform Institute has started a new chemical information service at the same location.

A file of trademarks in the chemical and allied fields in now available for immediate use. A unique feature of this file is that it includes registered, unregistered, common, trivial, foreign, scientific and technological names in most every type of chemical- and chemical-using industry. In many cases, the chemical composition or active ingredients, use of the product, and name of the manufacturer are given. It is international in scope, serving the most important foreign countries in addition to the United States.

• NAMES IN THE NEWS •

Naugatuck Chemical Div, U S Rubber Co, has named **Lawrence H Bruce** sales manager of latices and **Thomas D Ramsey**, district sales manager in the Gastonia, NC area.

In his new position, Mr Bruce, who was formerly assistant sales manager of colloidal products, will be responsible for planning the sales activities of all basic latices produced and sold by the division.

Mr Ramsey, formerly a technical sales representative for the division in the Los Angeles area, will replace **Claude H Allard**, who has been assigned a production post at Naugatuck, Conn. In his new post, Mr Ramsey will be responsible for sales of all the division's products in the South Atlantic district as well as the production of the Gastonia Lotol compounding plant. He will report to **G L Dennis**, manager of field sales.

Century Chemical Corporation, a recently formed chemical manufacturing company with facilities in the United States and Europe, has announced the election of four additional directors. Appointed to the board are:

George T Bayley, chairman of the board, Calkin & Bayley, Inc, New York; **Leonard J Bertoli**, Handleman Co, Detroit; **John J Levenson**, Frederic H Hatch & Co, Inc, New York; and **Charles W B Wardell Jr**, President, The Deltec Corp, New York.

Already serving on the board of the new company are **Theodore S Hodgins**, president of Century Chemical; **John J Levenson Jr**, executive vice president and treasurer of Century; and **Thomas P Ford**, partner in the law firm of Shearman & Sterling & Wright.

Lawrence

Thomas

Hart Products Corp, New York, has announced two new additions to its technical sales force and one to its laboratory staff.

Victor H Lawrence has been appointed representative for the Western part of the United States for the sale of textile, leather and industrial chemicals. Mr Lawrence, who will make his headquarters in Chicago, was formerly sales representative and demonstrator for E F Drew & Co.

Gary Thomas has been appointed technical sales representative serving the textile and paper industries in New York State and Western Connecticut. Mr Thomas most recently was a sales representative for Onyx Oil & Chemical Co. He will make his headquarters in Rhinebeck, N Y.

Joseph Cafasso has joined Hart Products' laboratory staff as head of the Textile Resin Research and Development Department. Mr Cafasso formerly held positions as research and development chemist with Seydel-Woolley & Co, Warwick Chemical Co and American Viscose Corp.

Malcolm B VerNooy has been named product manager in the new chemicals group of Union Carbide Chemicals Co, division of Union Carbide Corp. In his new position, he will direct the market development of Carbide's chemicals that are used in resin applications, and will be responsible for the marketing of acrylates.

Carbide also has announced the transfers of the following technical representatives: **D Wallace Enright** from the Charlotte District to the Chicago District; **Alan J Lyon** from the General Sales Office to the Charlotte District; **Alan R Mitchell** from the New York District to the Philadelphia District; and **Joseph L Suhadolnik** from the General Sales Offices to the Newark District.

The following recent chemical engineering graduates have joined Carbide's Development Dept: **Howard M Bartlett, Donald H Sargent, Donald W Simroth**, and **Dodson C Webster**.

Eight students in the A French Textile School of the Georgia Institute of Technology were recently awarded scholarships.

Recipients of $600 freshman scholarships from the Textile Education Foundation are: **William B Huey, William K Hammond, Philip L Lane, Hugh E Brodie Jr**, and **Jonathan O Huff**. The Foundation also has awarded a $600 scholarship to a senior, **John P Kitchens**.

Other senior scholarships included: $500 to **Jimmy M Hester** by Ciba Co, Inc; $250 to **Oliver McGowan** by Seydell-Wooley & Co; and $200 to **Duell L Johnston** by the U S Rubber Co.

In addition to the above, 18 textile students are attending Georgia Tech with four-year Textile Education Foundation scholarships in the amount of $600 per year.

General Calendar

AMERICAN ASSOCIATION OF TEXTILE TECHNOLOGY
Jan 7, Feb 4, Mar 4, Apr 1 (Della Robbia Room, Hotel Vanderbilt, New York, NY)

AMERICAN COTTON MANUFACTURERS INSTITUTE
Mar 19-21 (Annual Convention — Palm Beach Biltmore Hotel, Palm Beach, Fla)

AMERICAN OIL CHEMISTS SOCIETY
April 20-22, 1959 (Roosevelt Hotel, New Orleans, La; Sept 28-30, 1959 (Statler Hotel, Los Angeles, Calif)

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, TEXTILE ENGINEERING DIVISION
March 12-13 (Annual Spring Meeting, Clemson House, Clemson, SC)

CANADIAN ASSOCIATION OF TEXTILE COLOURISTS AND CHEMISTS (QUEBEC SECTION)
Jan 30 (joint meeting with Textile Society of Canada Eastern Div, Ritz Carlton Hotel, Montreal); Feb 21, Mar 21, Apr 18 (McGill Univ, Montreal, Que); June 20 (Annual Golf Tournament)

THE FIBER SOCIETY
April 29-30 (Fontana Village, NC)

KNITTING ARTS EXHIBITION
May 4-8 (Atlantic City Auditorium, Atlantic City, NJ)

NATIONAL COTTON COUNCIL
Oct 7 (Chemical Finishing Conference, Mayflower Hotel, Washington, DC)

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES
Jan 13, Feb 10, March 11 (Luncheon meetings at the Hotel Roosevelt, New York, NY)

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OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

AMERICAN

DYESTUFF REPORTER

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PERMA SET 500 C

a new type thermosetting resin which is used to stabilize rayon and rayon blends and to improve their hand.

PERMA SET 750

a methylated urea-formaldehyde resin which is used to give nylon, acetate and other synthetic fabrics durable stiffness and body. It is recommended for use on nylon nets, marquisettes and shoe fabrics.

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AMERICAN
DYESTUFF REPORTER

Volume 47
January, 1958 - December, 1958

Including the
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PROCEEDINGS OF THE
AMERICAN ASSOCIATION OF
TEXTILE CHEMISTS AND COLORISTS

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